

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



- Armenia
- Azerbaijan
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FOREWORD

Innovation – or the systematic experimentation with new ideas – will be essential for countries in Eastern Europe and the South Caucasus (EESC) in creating new points of competitive advantage and consolidating and strengthening existing ones to form the foundation and growth engines needed to reach the ambitious Sustainable Development Goals. With their high education levels, histories of research excellence, and strong political and societal commitment to innovation, the EESC countries carry substantial potential for innovation-driven growth. Realizing this potential requires sound, flexible and evidence-based policy interventions that, put simply, enable and promote broad experimentation across the economy and society. EESC countries have put such interventions high on their policy agendas, engaging in a broad range of support mechanisms, such as incubators, technology parks, public research and fiscal incentives – but our research shows substantial room for reform to target innovation in a concerted fashion. As the COVID-19 pandemic demonstrates the need for resilience and further constrains fiscal space, and as social spending and public debt grow, the imperative to maximize the positive impact of public support is clearer now than ever.

This first iteration of the UNECE Sub-regional Innovation Policy Outlook (IPO) supports the EESC countries through a comparative assessment of the quality and scope of innovation policies, institutions and processes and offers actionable policy recommendations at the national and sub-regional levels. EESC policymakers can draw on the IPO to identify strengths and weaknesses in policies and institutions, to enlarge the evidence base for policy dialogue and learning among EESC countries, and to set priorities and design effective interventions.

The IPO represents one step on the path of improving the EESC countries' innovation policies, institutions and processes in line with good policy practices and principles, as elaborated through UNECE work on innovation and competitiveness. I look forward to continuing to strengthen UNECE's cooperation in support of EESC governments' policy priorities.



Olga Algayerova
Executive Secretary
UNECE

PREFACE

The Sub-regional Innovation Policy Outlook (IPO) of the United Nations Economic Commission for Europe (UNECE) was developed on the basis of a mandate from the UNECE Committee on Innovation, Competitiveness and Public-Private Partnerships. It aims to offer policymakers in Eastern Europe and the South Caucasus (EESC) a framework for identifying strengths and weaknesses in their national innovation systems and setting up effective innovation policies and support mechanisms, as well as the institutions and processes to design and run them efficiently. The IPO also provides guidance to international donors and private investors on opportunities to support and invest in innovation for sustainable development in the EESC sub-region.

Importantly, the IPO complements international composite indices and other benchmarking frameworks, such as the Global Innovation Index (GII, World Intellectual Property Organization) and the Global Competitiveness Index (GCI, World Economic Forum), in two ways:

- 1.** By assessing the role of policies, support mechanisms and institutions in translating innovation inputs, such as infrastructure and educational attainment, to outputs, such as private sector innovation and intellectual property registrations. As innovation policy often involves targeted public support for specific projects, which can be expensive and involve substantial, unintended trade-offs, assessing these elements is important to ensure that scarce public resources are put to optimal use, that policies systematically contribute to innovation for sustainable development and that institutions, processes and incentives are able to put them into practice.
- 2.** By applying an assessment framework adapted to the economic, political, structural, historical and institutional factors that strongly influence innovation-led development in a specific sub-region. Common factors that set EESC countries apart from other countries at comparable output levels include a legacy of economic planning, an atrophying yet tangible tradition of applied and frontier research, and high levels of educational attainment overall and in science, technology and engineering in particular, as well as the potential for further economic integration among the EESC countries and with the Eastern and Central Europe region.

The underlying research involved a comprehensive assessment process, including government self-assessments, independent and parallel expert analysis, and broad consultations. The findings were discussed, further developed and reconciled through national and sub-regional meetings involving hundreds of innovation stakeholders.

The IPO has three pillars. Pillar I, innovation policy governance, assesses the overarching strategic, institutional and legal frameworks supporting innovation policy, as well as coordination and collaboration linkages among government agencies in charge of innovation. Pillar II, innovation policy tools, looks at the range and quality of support mechanisms in place. Pillar III, innovation policy processes, examines the scope, nature and effectiveness of rules, processes and mechanisms and, in particular, the role of evidence and data throughout the policy cycle.

By engaging the EESC countries in an intensive process with high-level buy-in and strong national ownership, the IPO has already created momentum. Scoring and evaluating countries across a range of indicators forms the basis for sustained peer learning. I strongly hope that this dynamic will continue and intensify, as innovation is essential for the EESC countries to progress towards the Sustainable Development Goals. UNECE's Economic and Trade Division stands ready to support the implementation of the IPO's recommendations with the support of donors and the aim of building back better after COVID-19.



Elisabeth Tuerk

Director, Economic Cooperation and Trade
UNECE

EXECUTIVE SUMMARY

Context for and objectives of the Sub-regional Innovation Policy Outlook

Countries in the Eastern Europe and the South Caucasus (EESC) sub-region have considerable potential for sustainable growth and development. The post-independence transition process has been rocky: after half a century of central planning, it took decades to regain the output levels of 1990 and to set up the fundamental elements of a functioning market economy. With many of these elements now in place, as well as high levels of educational attainment, a relatively diversified production structure in some countries, a tradition of public research, a strong commitment to innovation and a range of opportunities for trade and investment, these countries should hold substantial potential for sustainable growth.

Yet, this potential will not happen automatically with the current trends: several growth drivers are reaching the point of diminishing returns and look increasingly unlikely to underpin progress towards the Sustainable Development Goals (SDGs) in the medium term. The boom many countries saw in the first decade of the century was driven mainly by market- and resource-seeking investment and credit- and remittance-fuelled consumer spending. Most countries have seen total factor productivity slow or even decline, in part due to negative reallocation of factors of production from more to less capital-intensive activities, such as from manufacturing to domestic services. Manufacturing has declined substantially in terms of output, employment and diversification, and most countries rely on low value added commodity exports and remittances for foreign revenue. The COVID-19 pandemic is the latest, and potentially the most severe, of a long series of external shocks that have hit the region.

Against this background, making the most of each country's potential requires systematic and continuous experimentation with new ideas that could make more out of human and natural resources – in other words, innovation. Such experimentation is under way, with the rise of export-oriented services in information and communication technology (ICT) and business-process outsourcing being a prominent example. But to enable sustainable development, including progressing towards an increasingly circular economy and building resilience to events such as the COVID-19 pandemic, experimentation with ideas and technologies must become systematic across the economy and society. This requires entrepreneurship, or specifically a small sub-group of innovative, potentially high-growth entrepreneurs, investors and researchers who systematically look for opportunities and try out solutions – supported by a good business climate, a solid research system, competitive markets and targeted, effective support policies that defray risks and help overcome market failures.

Enabling, promoting and sustaining such a dynamic is the central challenge of innovation policy in the EESC sub-region, especially in the context of uncertainty about globalization, rapid technological change and the increasingly untenable nature of the development trajectory that produced the success stories of East Asia. Innovation is equally central to

public policy playing an effective role in enabling and promoting this dynamic: the nature and complexity of the challenge, especially in the broader context of reduced fiscal space and the imperative to increase the impact of scarce public resources, requires effective, flexible institutions and processes for designing, coordinating, driving and evaluating policies and instruments.

The Sub-regional Innovation Policy Outlook (IPO) of the United Nations Economic Commission for Europe (UNECE) guides EESC countries in responding to this challenge through a concerted, systematic and comprehensive assessment and comparison of innovation-related policies, institutions and processes across countries and across a set of good practices and with a clear sustainable-development perspective. The IPO complements international composite indices, such as the World Intellectual Property Organization's Global Innovation Index and the World Economic Forum's Global Competitiveness Index, by looking more closely at the role that policies and institutions play in enabling and promoting innovation and by focusing on a group of countries with shared economic, structural, legacy and institutional features, challenges and opportunities. The results can inform policy dialogue, reform processes, joint initiatives, donor-funded programming and investment.

Structure of the Sub-regional Innovation Policy Outlook

The IPO has three pillars. The first, innovation policy governance, assesses the overarching strategic, institutional and legal framework for innovation policy, as well as the nature, capacity, incentive structure, quality and effectiveness of the corresponding agencies, coordination bodies and processes. The second pillar, innovation policy tools, covers the nature, scale, scope, quality, impact and implementation status of key policy areas related to innovation. The third pillar, innovation policy processes, examines the scope, nature and effectiveness of rules, procedures and mechanisms, as well as the role of evidence and data during policy design, implementation and post-implementation, using a specific project or programme under way or completed in each country. Drawing on this analysis, this third pillar derives broader policy lessons for innovation policymaking that are based on general good regulatory practices.

Main findings and recommendations of the Sub-regional Innovation Policy Outlook

Although many of the fundamental elements for innovation-driven sustainable development are in place, progress is limited. EESC countries perform well compared with their income-group peers on important innovation input indicators such as educational attainment, political commitment and a waning but still critical mass of public research institutions. Yet these factors do not systematically lead to corresponding innovation outputs, such as diversification towards knowledge-intensive, tradeable products and services and, ultimately, sustainable economic growth.

As this report illustrates, this problem stems in part from an overly narrow view of innovation, especially from a public policy perspective, as restricted to scientific research and high-technology start-ups rather than as a vehicle for sustainable development overall. Another factor is the limited amount of vibrant linkages and systematic interaction among the actors in the broader national innovation system, including collaboration between science and industry, and the nascent stage of development of some of the most important elements, such as markets for risk capital. The strong role of less efficient State-owned enterprises lacking market competition in several sectors and concerns about corruption and rule of law constrain domestic and foreign investment and entrepreneurship to the least innovative and risky activities. Laws and regulations contain both significant gaps and a legacy of rules that protect entrenched interests and constrain experimentation.

The complexity of innovation systems and the scope of the challenge, especially in the broader context of the SDGs, require a significantly higher degree of coordination and alignment than is currently taking place. At the policy level, long-term innovation strategies do not systematically align with SDG priorities and those of central, related policy areas such as industrial development, promotion of small and medium enterprises (SMEs) and public research. At the level of design and implementation, few systematic mechanisms exist for interministerial coordination and multi-stakeholder consultations to explore needs and complementarities, align and consolidate efforts, and monitor and evaluate impact.

Recognizing the importance of innovation, EESC countries engage in a range of targeted support measures to support experimentation in the private sector – albeit with limited impact. Countries offer a wide array of business development services, infrastructure such as technology parks and incubators, and concessional finance schemes. Several factors constrain their effectiveness. There is a strong emphasis on technology start-ups and less attention to gradual, adaptive innovation in the economy overall – where most of the potential lies. A clear life-cycle perspective is missing, with many gaps in support at different stages. Countries would benefit from a concerted approach to cater to the needs of the small sub-group of innovative, potentially high-growth entrepreneurs that could consolidate and complement existing measures. Finally, funding and institutional capacities are at times not sufficient to put ambitious plans into practice.

As innovation is, by definition, uncertain, its very nature conflicts with the traditional, planning-oriented approach to policy and public support – making a solid, transparent yet flexible approach to the different steps in the innovation policy cycle essential in all EESC countries. Solid policy foresight exercises, broad stakeholder consultations, in-depth analysis of and clarity about market failures and the rationale for intervention, clear and detailed performance indicators, and continuous monitoring of impacts and regular reviews that inform reforms and further interventions – all are essential to maximize the positive effect of interventions.

Some of the central areas for reform and related recommendations include the following, listed by IPO pillar:

Pillar I: Innovation policy governance

- **Legal and institutional frameworks are not sufficiently robust to support innovation policy effectively.** Improve the enforcement of laws and regulations. Simplify and adapt rules where possible, aiming to enable rather than constrain innovation. Fill regulatory gaps and remove constraints on risk capital investment, insolvency, start-ups and spin-offs. Harmonize national legal frameworks with international standards and best practices.
- **Coordination across policy areas relevant to innovation is insufficient.** Integrate different elements of innovation policy into a coherent strategic document covering, in particular, research, technology and private sector development. Align the strategy carefully with overarching strategies for socioeconomic and sustainable development. Set up and empower mechanisms for supervision and coordination, at both the ministerial and the working levels.
- **Funding of strategic initiatives in innovation is low.** Move from suboptimal financing mechanisms to new arrangements for allocating funding. Improve the quality of governance and the accountability and transparency of public institutions. Explore alternative funding by taking advantage of private and international sources.

Pillar II: Innovation policy tools

- **Broad, systematic and effective policy support for knowledge absorption is still underdeveloped.** Design, monitor and evaluate business support mechanisms and infrastructure to align services more clearly with existing and potential needs and opportunities. Promote good public and private sector organizational and managerial practices. Introduce co-financing mechanisms for technical and business services. Review the complex systems of fiscal incentives and exemptions to ensure measures clearly target and catalyse experimentation with new ideas, rather than activities that are established or would take place without support.
- **The lack of systematic support throughout the different phases of firm development, compounded by low access to finance for innovation, limits efforts to promote innovation.** Engage in regular consultations to scout needs and opportunities to inform policy design. Develop a framework for regular monitoring and evaluation of support schemes for the different stages in the firm life cycle, as well as post-evaluation of beneficiary projects. Enable and catalyse risk finance, such as venture capital, to address the gap between seed funding and early-stage development of innovative start-ups and to systematically finance innovation across the economy.
- **Relationships and linkages among actors in the innovation system are limited, especially among science, academia, and the private sector.** Extend the policy mix of innovation voucher schemes and cooperative research and development (R&D) grants to target more clearly pilot initiatives to align applied research with private sector needs and to explore the commercial potential of research results across the sub-region. Develop a comprehensive framework for monitoring and evaluating

the innovation support infrastructure, assess market needs and integrate business and technical services in the portfolio of relevant structures. Expand the incentives for mobility between academia and industry.

- **Policy tools do not sufficiently support the systematic diffusion of knowledge through industrial technology assistance and brokerage schemes for technology upgrading, and the potential of public procurement policy is not fully explored.** Stimulate innovative development through demand-based policies and contribute to the diffusion of innovation for broad public use by implementing innovation-enhancing public procurement. Extend policy support for industrial technology assistance to stimulate technological advancement of production processes. Develop further the digital infrastructure to enhance connectivity in the sub-region.
- **The prevalent mismatch between education and research system outputs and the needs of innovative entrepreneurs obstructs further enhancement of research and education across the sub-region.** Stimulate R&D activity in the public sector by increasing the levels of R&D funding and ensure its efficient use. Conduct a comprehensive impact assessment of research initiatives and grant programmes to identify potential inefficiencies and drivers of innovative development. Consider expanding schemes for commercializing research. Build a science, technology, engineering and mathematics (STEM) community by engaging educators and individuals within and outside formal educational settings to popularize STEM education and make technical careers more accessible.

Pillar III: Innovation policy processes

- **The underlying analysis that should inform effective innovation policy design is limited and not sufficiently based on evidence.** Integrate innovation foresight practices into the policymaking processes of relevant ministries to capture future trends in and perspectives on research activities for incorporation in the long-term strategic direction of innovation development. Review the legal frameworks for preparing policy to ensure that they are clear, flexible, appropriate for the purpose and consistently used. Build on regulatory impact analysis efforts to enhance the quality of policy preparation and its evidence base, ensuring that efforts add value, not administrative burden, and become sustainable.
- **Multi-stakeholder scrutiny of government work and participation in innovation policy design is not systematically ensured.** Develop or enhance approaches to public-private consultations by relevant line ministries on policy design and implementation, as part of the regular policy cycle and decision-making processes. Strengthen interministerial consultation processes, ensuring that all relevant government bodies take part in the policy design process and have enough time to comment.
- **Policy evaluation and impact assessments are of poor quality or not implemented at all.** Establish a culture of evaluating policies and promote the quality of policies, for instance through guidelines, capacity-building and ex-post review and control mechanisms. Adopt a more systemic linkage of monitoring and evaluation practices with policy design, including in government bodies responsible for science, technology and innovation policy.

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ABBREVIATIONS

ADAU	Azerbaijan State Agricultural University
ADB	Asian Development Bank
ANAS	Azerbaijan National Academy of Sciences
APPAU	Association of Industrial Automation Enterprises of Ukraine
ASAN	Azerbaijan Service and Assessment Network
B2B	business to business
BEEPS	Business Environment and Enterprise Performance Survey (EBRD)
BIF	Belarus Innovation Fund
BNTU	Belarusian National Technical University
CID	Center for International Development
CIP	Competitive Industrial Performance (Index)
DCFTA	Deep and Comprehensive Free Trade Agreement
EAEU	Eurasian Economic Union
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECFR	European Council on Foreign Relations
EEN	Enterprise Europe Network
EPO	Export Promotion Office (Ukraine)
EU	European Union
FEZ	free economic zone
FDI	foreign direct investment
GCI	Global Competitiveness Index
GDP	gross domestic product
GENIE	Georgia National Innovation Ecosystem
GII	Global Innovation Index
GITA	Georgia's Innovation and Technology Agency
GIZ	German Society for International Cooperation (Gesellschaft für Internationale Zusammenarbeit)
GNAS	Georgia National Academy of Sciences
GSIP	Great Stone Industrial Park (Belarus)
HEI	higher-education institution
HTP	Hi-Tech Park (Belarus)
IBRD	International Bank for Reconstruction and Development
ICT	information and communication technology
IDRC	International Development Research Centre
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
IPO	Innovation Policy Outlook (UNECE)
IPR	intellectual property right
ILO	International Labour Organization
ISO	International Organization for Standardization

IT	information technology
ITC	International Trade Centre
JRC	European Union Joint Research Centre
KNEU	Kyiv National Economic University (Ukraine)
KPI	key performance indicator
MECR	Ministry of Education, Culture and Research (Republic of Moldova)
MEDT	Ministry of Economic Development and Trade (Ukraine)
MEI	Ministry of Economy and Infrastructure (Republic of Moldova)
MENR	Ministry of Ecology and Natural Resources (Ukraine)
MESCS	Ministry of Education, Science, Culture and Sport (Georgia)
MoE	Ministry of Economy (Belarus)
MoES	Ministry of Education and Science (Georgia, Ukraine)
MoESCS	Ministry of Education, Science, Culture and Sport (Armenia)
MoESD	Ministry of Economy and Sustainable Development (Georgia)
MoHTI	Ministry of High-Tech Industry (Armenia)
MTCHT	Ministry of Transport, Communications and High Technologies (Azerbaijan)
NACS	National Academy for Civil Service (Ukraine)
NARD	National Agency for Research and Development (Republic of Moldova)
NAS	National Academy of Sciences (Belarus)
NASU	National Academy of Sciences (Ukraine)
NBU	National Bank of Ukraine
ODIMM	Organization for Small and Medium-sized Entrepreneurship (Republic of Moldova)
OEC	Observatory of Economic Complexity
OECD	Organization for Economic Cooperation and Development
PISA	Programme for International Student Assessment
PLEDDG	Partnership for Local Economic Development and Democratic Governance Project
PPP	purchasing power parity
R&D	research and development
RBF	Russian-Belarusian Venture Investment Fund
RCA	revealed comparative advantage
RCTT	Republican Centre for Technology Transfer (Belarus)
RDI	R&D and innovation
RIA	regulatory impact assessment
RIC	Research and Innovation Council (Georgia)
S&T	science and technology
SRNSFG	Shota Rustaveli National Science Foundation of Georgia
SCST	State Committee on Science and Technology (Belarus)
SDGs	Sustainable Development Goals
SIGMA	Support for Improvement in Governance and Management (OECD, EU)
SMEs	small and medium enterprises
SMBDA	Small and Medium Business Development Agency (Azerbaijan)
SMEDA	Support to the SME Development in Armenia
SMEDO	SME Development Office (Ukraine)
SMGP	Start-up Matching Grant Programme (Georgia)
SOE	State-owned enterprise

SPSR	State programme for scientific research (Belarus)
SSTP	State science and technology programme (Belarus)
STEM	science, technology, engineering and mathematics
STEP	Science and Technology Entrepreneurship Programme (Armenia)
STI	science, technology and innovation
SWOT	strengths-weaknesses-opportunities-threats
TBS	technical and business services
TFP	total factor productivity
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VAT	value added tax
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

METHODOLOGY AND PROCESS

Context and objectives

At its 12th session, on 26–28 May 2018, the UNECE Committee on Innovation, Competitiveness and Public-Private Partnerships decided to pilot a Sub-regional Innovation Policy Outlook (IPO) to assess and benchmark the scope and quality of innovation policies, institutions and processes across six countries in Eastern Europe and the South Caucasus (EESC): Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine.¹

The IPO complements existing international composite indices, such as the Global Innovation Index (GII) and the Global Competitiveness Index (GCI), in two ways:

1. By capturing core mechanisms that translate innovation inputs, such as infrastructure and institutional quality, to outputs, such as private sector innovation and intellectual property registrations. As innovation policy often involves targeted public support for specific projects, which can be expensive and involve substantial, unintended trade-offs, these issues are of utmost importance to ensure that scarce public resources are put to optimal use, that policies systematically contribute to innovation for sustainable development and that institutions, processes and incentives are able and sufficient to put them into practice.
2. By applying an assessment framework adapted to the economic, political, structural, historical and institutional factors that strongly influence innovation-led development in a specific sub-region. Common factors that set EESC countries apart from other countries at comparable output levels include a legacy of economic planning, an atrophying yet tangible tradition of applied and frontier research, and high levels of educational attainment overall and in science, technology and engineering in particular, as well as the potential for further economic integration among the EESC countries and with the Eastern and Central Europe region.

Specifically, the IPO has five main objectives:

- Identify policy and institutional strengths and weaknesses.
- Enlarge and continuously update in subsequent editions the evidence base for policy dialogue and learning among the EESC countries.
- Identify, monitor and evaluate potential market failures and needs to set priorities and design effective interventions.
- Provide guidance for mobilizing donor funding and private investment to support reform efforts in line with the recommendations.
- Ultimately improve innovation policies, institutions and processes in line with good policy practices and principles elaborated through UNECE's work on innovation and competitiveness, thereby enhancing productivity and competitiveness in the EESC countries.

Methodology and structure

The IPO has three pillars:

- I. Innovation Policy Governance
- II. Innovation Policy Tools
- III. Innovation Policy Processes

Each pillar has several sub-pillars, which together contain 40 performance indicators.² The indicators assess central issues of governance, tools and processes, and enable comparisons across pillars and countries.

Pillar I, innovation policy governance, assesses the overarching strategic, institutional and legal framework for innovation policy, as well as the competences and nature, quality and effectiveness of coordination bodies and processes among the government bodies involved in innovation and related policy areas.

Pillar II, innovation policy tools, takes stock of policy tools or interventions in place to enable and support innovation. The analysis covers their nature, scale, scope, quality, impact and implementation status across central policy areas related to innovation.

Pillar III, innovation policy processes, examines the scope, nature and effectiveness of rules, procedures, mechanisms and, in particular, the role of evidence and data during policy design, implementation and post-implementation. Rather than analysing all policy processes, the analysis looks into a specific innovation policy – agreed on with partner governments – and draws broader lessons.

The leading data source for the analysis is a detailed questionnaire, with multiple, concrete questions for each indicator. In each country, these questionnaires were filled out by relevant government institutions and in parallel by local, independent experts, who collected information from non-governmental stakeholders. A comprehensive consolidation process ensured that these dual assessments were aggregated and aligned.

To quantify the indicators in pillars I and II, the IPO applies a straightforward scoring methodology that benchmarks strengths and areas for improvement. Each indicator of pillar I is assessed using a score from 1 to 3, depending on the degree of development of a policy initiative and its alignment with international good practice. Following a similar logic, each indicator of pillar II is evaluated using a score of four levels depending on the maturity stage of each measure. For pillar III, innovation policy processes, no quantitative score is given, as the pillar examines only one policy measure as a purely qualitative case study.

Research and consolidation process

The pilot IPO project had six phases:

Phase I (October 2018–March 2019) consisted of developing the concept and methodology in detail and putting together a comprehensive questionnaire, as well as engaging countries, securing political buy-in and identifying national focal points, stakeholders and local consultants.

Table 1 Local buy-in and ownership of the project

	High-level patronage	Focal point institution(s)
Armenia	<ul style="list-style-type: none"> Chairman of the Science Committee Deputy Minister of High-Tech Industry 	<ul style="list-style-type: none"> Ministry of High-Tech Industry
Azerbaijan	<ul style="list-style-type: none"> Deputy Minister of Transport, Communications and High Technologies 	<ul style="list-style-type: none"> Ministry of Transport, Communications and High Technologies
Belarus	<ul style="list-style-type: none"> Chairman of the State Committee on Science and Technology 	<ul style="list-style-type: none"> Belarusian Institute of System Analysis and Information Support of S&T Sphere
Georgia	<ul style="list-style-type: none"> Deputy Minister of Economy and Sustainable Development of Georgia 	<ul style="list-style-type: none"> Georgia's Innovation and Technology Agency
Moldova, Republic of	<ul style="list-style-type: none"> General Secretary of the Government Minister of Education, Culture and Research 	<ul style="list-style-type: none"> Ministry of Education, Culture and Research National Institute for Economic Research
Ukraine	<ul style="list-style-type: none"> Deputy Minister of Education and Science 	<ul style="list-style-type: none"> National Academy of Sciences Ministry of Education and Science

Source: UNECE.

Phase II (March–May 2019) entailed testing the research process and questionnaire in Georgia, which informed further refinements.

Phase III (May–September 2019) rolled out the assessment process in the other five countries. This work included country missions, stakeholder roundtables, training on the methodology and questionnaire that engaged the independent local experts, and supplementary desk research and fact-finding, as well as assessment by both government bodies and local experts.

Phase IV (October 2019–March 2020) focused on consultations with innovation stakeholders to discuss the initial findings, clarify divergences and fill information gaps. This work entailed a second round of stakeholder roundtables in each country as well as a final sub-regional meeting to validate findings for publication in March 2020.

Phase V (April–October 2020) entailed putting together the draft chapters, submitting them for country and expert review, and then finalizing, editing and designing the publication.

Phase VI (November 2020–December 2020) saw the publishing and launching of the publication sub-regionally and in each country, and the production of a pocket-book version.

Partners

The IPO project engaged a broad circle of stakeholders throughout the process. Involving governments through national focal points in each phase secured buy-in and ownership in all EESC countries. A clear process, with stakeholder roundtables and missions, coupled with frequent and structured interaction, was central to the success of the project. A larger group of public officials, experts and civil society organizations contributed to the research process, especially through the roundtables and review of draft chapters.

Several international organizations supported the process and reviewed the publication, including the Organization for Economic Cooperation and Development (OECD) (lead reviewer), the United Nations Resident Coordinator Offices, the United Nations Industrial Development Organization (UNIDO), the United Nations Development Programme (UNDP), UN Women, the World Bank, the European Union Joint Research Centre (JRC) and the European Bank for Reconstruction and Development (EBRD).

Notes

¹ ECE/CECI/2018/2 decision 4.8.9, p. 6.

² This three-tier structure (pillar, sub-pillar, indicator) was inspired by the OECD SME Policy Index, as were the dual assessment process and scoring methodology.

Part I

SUB-REGIONAL ANALYSIS

Chapter I

THE CENTRAL ROLE OF INNOVATION IN THE TRANSITION TOWARDS SUSTAINABLE DEVELOPMENT

Introduction

Independence brought a rocky transition to a market economy

To understand the importance of innovation for sustainable development in Eastern Europe and the South Caucasus (EESC), a cursory review of the past three decades is highly informative. Institutions change slowly. This factor was radically underestimated as overly swift and in part misguided liberalization efforts in these countries created a range of structural constraints. If not systematically addressed, these constraints will stymie the next stage of development in the region – especially if innovation, or experimentation with new ideas that create value and jobs for all, is to take centre stage.

After the fall of the Soviet Union, a raft of newly sovereign states passed through a rocky transition from a socialist, centrally planned system to a market-oriented one while creating national identities and constitutions, in some cases from scratch. The process brought dramatic developments, politically, economically and socially. Indeed, there had not been a similar transition in modern history to show the way. The sub-region witnessed the rapid break-up of the long-established economic integration of the region and of its institutional and technological links. This break-up was coupled with a lack of political will and a lack of clear political consensus about what a market economy was, how to transition to it, what the role of Government should be, if and how the public assets that made up the majority of economic assets should be privatized, and how strong and far-reaching the central planning legacy – in many cases bypassing price signals completely – would be. Ethnic and regional conflict, social unrest, political instability and the challenge of nation-building overall compounded these problems in most EESC countries.

The result – in the first half of the 1990s – was one of the most severe depressions in modern history, as entire sectors of the economy, unable to compete effectively, disintegrated and few new ones emerged. Output declined by as much as 80.2 per cent in Georgia (cumulative, 1989–2004), against the average decline of 31.4 per cent across the sub-region (UNECE, 2005). Although Soviet-era data on outputs are not entirely reliable and comparable with later macro-level indicators, the depression was – by any indication – substantial and protracted. Even as the EESC countries gradually found their bearings,

it still took more than two decades to regain the gross domestic product (GDP) levels of 1990. Despite substantial subsequent progress in the transition to a market economy, a number of challenges remain in ensuring sustainable, inclusive development.

The EESC countries, with the partial exception of Belarus, which took a notably more gradual approach to reform, were significantly slower to recover than the new EU member states – despite, as Gevorkyan (2018) argues, benefiting from a critical mass of industrialization and economic diversification with roots in the heavy investment into industry of the 1950s.¹ This recovery stands in stark contrast to that of post-war Europe, whose rapid recovery stemmed, in large part, from broad political consensus on the importance of recovery and need for planning, as well as strong public investment driven initially by the Marshall Plan – all elements that post-Communist countries did not have.

Only in the first decade of the 21st century did GDP in the sub-region start to recover in earnest, as countries benefited from “low-hanging fruit” – long-neglected, potentially profitable parts of the economy that became attractive after a series of macro reforms removed the most serious impediments to investment. Foreign and domestic investors seized attractive opportunities in banking, trade, infrastructure development and construction.

Much of that momentum has stagnated in the past decade, as concerns grew over the long-term consequences of rising joblessness (Richter and Witkowski, 2014), giving rise to the question of potential future sources of growth and sustainable development. The same is true for productivity trends. The growing gap with Central Europe and the Baltics demonstrates that the EESC sub-region must complement its attention to fundamental macro- and micro-level reforms with concerted attention to enabling and promoting experimentation with new ideas and scale up what works – in other words, innovation. Despite institutional and structural progress in the last couple of years, challenges for the future are manifold. Overcoming them will depend on the ability to exploit opportunities emerging from creative ideas, innovations and technology, and to design flexible policies, rules and institutions to enable and promote experimentation.

This consideration is at the heart of the first IPO for the EESC sub-region, which aims to compare, evaluate and guide reform efforts to upgrade innovation policies, institutions and processes. It falls squarely within the role of UNECE in supporting countries with economies in transition, in the context of both Agenda 2030 and the Sustainable Development Goals (SDGs), in a range of policy areas that include economic development and cooperation, trade and innovation.

Economic trends and dynamics

At the core: consistent difficulty enabling and promoting innovation to improve productivity

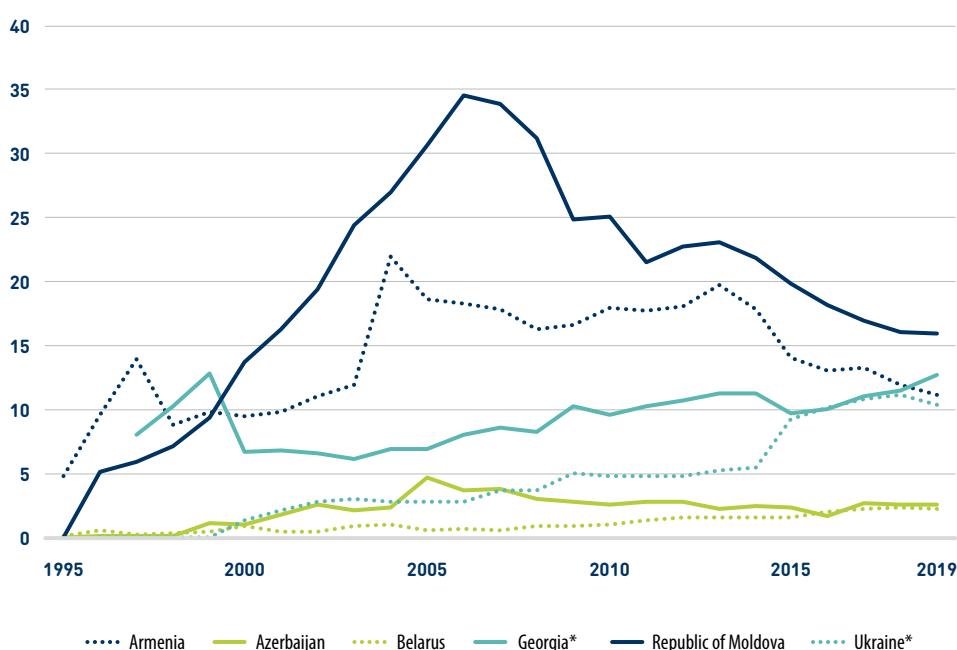
Current trends point to a dynamic in which most growth has come from relatively straightforward means: reallocation of resources – labour, capital, skills, technology – from a planned economy to more efficient uses driven by market prices; market-seeking investment into the economic activities that make economies work, such as finance,

construction, telecommunication and mining; and consumption, driven largely by household debt and remittances – the latter making up over 10 per cent of GDP in many EESC countries, but fluctuating strongly (figure I.1). This path has not, however, been easy – several problems remain, and inequality has risen.

This can be observed clearly by looking at how productivity changes contributed to growth over the past decades. Insufficient gains, and in many cases losses, remain evident across the sub-region – in industry, agriculture and services. As figure I.2 shows, five of the six EESC countries lagged behind Central Europe and the Baltics on industrial labour productivity in the period 2000–2019. Only Azerbaijan performed better, but this stems largely from its reliance on large investment into capital-intensive, employment-poor extractive industries such as oil. The same applies to the services sector, where the lag in productivity is even larger (figure I.3).

This suggests that, following a sharp slump with massive destruction and write-downs, productivity has largely been driven by three forces: the accumulation of capital (physical capital, such as machinery, and to a lesser extent human capital, such as useful and relevant skills in the labour force – including the ones needed to use the physical capital well); investment and reallocation into the manifold immediate opportunities of transition; and exports of commodities and natural resources based on the productive capacities that largely had been built up before independence. Clearly, this dynamic is hitting the point of diminishing returns: once the EESC countries had erected new buildings, set up a banking system and put in place necessary hard infrastructure, they needed to turn their attention to efficiency, diversification and better use of technology.

Figure I.1 • Remittances received, 1997–2019 (Per cent of GDP)



Source: UNECE, based on data from the World Bank (2020a).
*Missing values for Georgia (1995–1996) and Ukraine (1995).

These become especially urgent as wages have risen and opportunities for labour-intensive manufacturing have receded as part of a worldwide trend towards deindustrialization and the ascent of the service economy. The Conference Board calculations of total factor productivity (TFP) echo this trend: the strong TFP growth in the first decade of the century subsided and in some cases turned negative in the 2010s, indicating that economies grew mostly by factor accumulation rather than by using those factors efficiently – a process in which innovation is essential.

The lack of a clear development path based on endowments and opportunities makes well-targeted, efficient State support through innovation and related policies important to support the experimentation with ideas that is necessary to find out what works, especially given that most EESC countries are small and dependent on a limited set of commodity exports in export markets. A clear orientation towards sustainable development should guide these efforts: long-term economic growth relies on good, sustainable use of human and environmental resources.

Figure I.2 · Value added per worker in industry (including construction), 2000–2019 (Constant 2010 \$1,000)

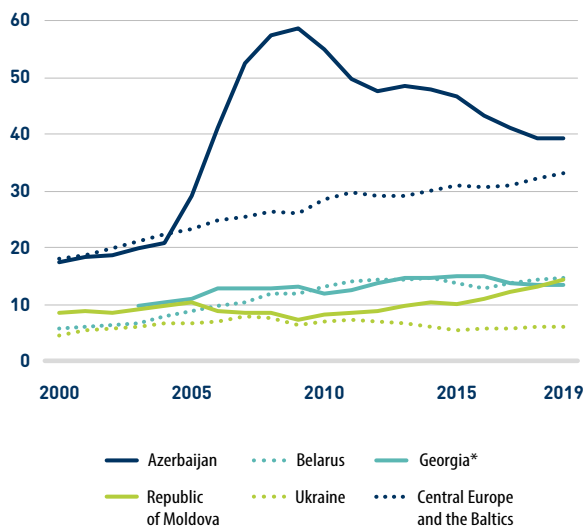
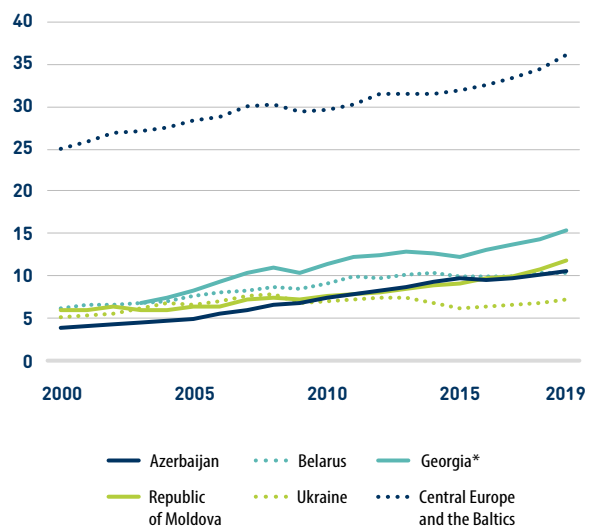


Figure I.3 · Value added per worker in the services sector, 2000–2019 (Constant 2010 \$1,000)



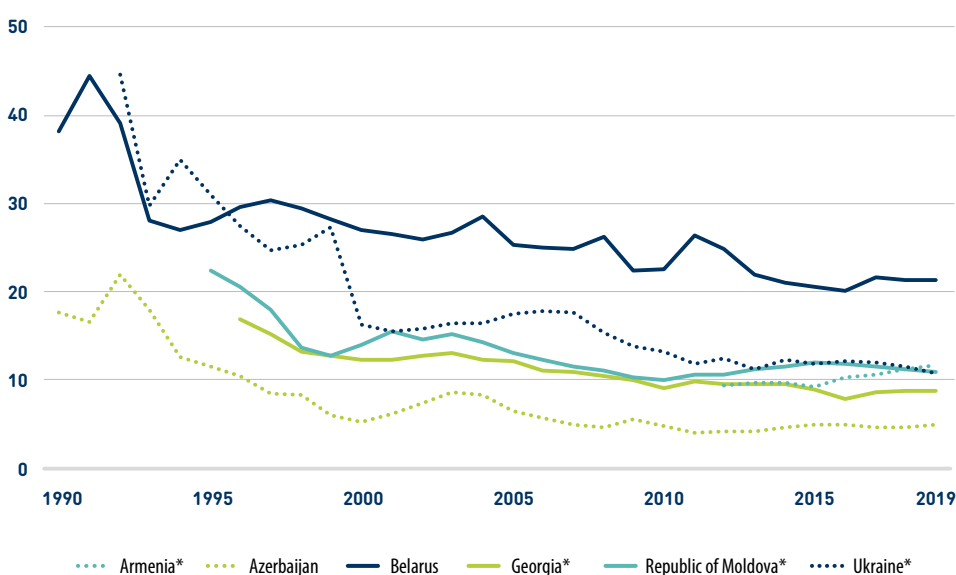
Source: UNECE, based on data from the World Bank (2020a).
Note: Values not available for Armenia.
*Missing values for Georgia (2000–2002).

Deindustrialization contributes to negative sectoral reallocation: many resources move from more to less productive activities

Part of the reason for these trends is deindustrialization, both worldwide and in the EESC sub-region in particular, which in turn has released resources that have moved to less productive activities. Four factors – low efficiency; the lack of competitiveness in terms of quality and market prices; lingering uncertainty about asset valuation and ownership; and the sudden disappearance of Soviet supply chains, fixed prices and quotas – triggered a rapid contraction in manufacturing, as companies suddenly faced exposure to market competition in the first decade of independence. To some extent, these effects still hamper sustainable growth. As figure I.4 shows, Ukraine lost two-thirds of its manufacturing share in GDP since 1990, while Belarus – whose transition was deliberately gradual – lost about half. Only since 2014 has this trend slowed or slightly reversed.

In 2019, the manufacturing sector of the EESC countries – with the exception of Belarus – contributed 12 per cent or less to GDP, a significant decline compared with the early 1990s, when in countries such as Ukraine and Belarus the sector contributed 45 per cent to GDP (each in 1993) (see figure I.4). In Azerbaijan the value added of the manufacturing sector since 2010 amounts to a constant 5 per cent. At the firm level, Mitra (2008) points out that productivity gains in manufacturing during the transition period were largely achieved within the sector, rather than from sectoral reallocation. In other words, gains came from companies becoming more productive, rather than from a systemic shift of resources, labour and capital from less to more profitable activities (figure I.3). These elements are the main drivers of the productivity gains of individual companies, but less so for the EESC countries as a whole.

Figure I.4 · Value added of manufacturing as a share of GDP, 1990–2019



Source: UNECE, based on data from the World Bank (2020a).

*Missing values for Armenia (1990–2011), Georgia (1990–1995), the Republic of Moldova (1990–1994) and Ukraine (1990–1991).

This effect, termed negative intersectoral resource reallocation, has indeed been negative on average: capital and labour have shifted from capital-intensive manufacturing to less capital-intensive services and, to some extent, small-scale agriculture. Most of the labour force is employed in activities whose output per worker is below the overall average and far below that of manufacturing, ICT and utilities. We can measure this by noting productivity gaps among sectors, which are far higher than in Central Europe and the EU – a symptom of systemic constraints on a dynamic where resources flow to where they can be best put to use.

Compared with Central Europe and the Baltics, productivity in the services sector is significantly lower in all six EESC countries. Sectoral services-led growth in the EESC countries is driven mainly by the financial sector, trade and public services rather than by high value added, knowledge-intensive (technology-based) services, as in Western European countries. In 2017, however, ICT services exports accounted for a larger share of total services exports in Ukraine (19.5 per cent), the Republic of Moldova (13.9 per cent) and Belarus (18.4 per cent) compared with Central Europe and the Baltics (11.3 per cent), which indicates a comparative advantage (World Bank, 2020a).

The driver for this is, of course, innovation – broad, systematic experimentation with ideas to find out what works and what does not, and how resources can be put to best use – which will be central to build the underpinnings for long-term sustainable development. Research shows that several factors can play an inordinate role in constraining innovation, including rigid labour market regulations that constrain labour movement and risky investment, the prevailing system of State ownership of productive assets that not only may not operate efficiently but also crowd out competition, and insufficient or poorly enforced investor protection and property rights. Equally important – as a range of externalities and market failures, even in an efficient business climate, continue to constrain the societally optimal level of innovation – will be targeted, cost-effective measures and a productive, flexible role for government. This concern is at the core of the IPO.

Reallocation stems from limited innovation in upgrading, expanding and diversifying activities

These trends coincided with an equally steep decline and subsequent stagnation in the already modest levels of technology and applied research and development (R&D), an area of strength in the Soviet economy. No EESC country plays a significant role in the international markets for knowledge-intensive products and services. As chapter II explains, the overall technological competitiveness or performance in the region is weak: The Global Innovation Index shows moderate and stagnating performance on knowledge diffusion, an aggregate score covering intellectual property receipts, high-tech net exports, ICT service exports and net outflows of foreign direct investment (FDI).

As this report will illustrate, this weakness stems in part from an overly narrow view of innovation, especially from a public policy perspective, as restricted to research, technology and high-tech start-ups rather than as a vehicle for sustainable development overall. This perception misses most of the potential of innovation. Reflecting broad consensus, Radosevic (2017) notes that most innovation potential in the sub-region lies outside this narrow focus, in elements such as improving production capabilities, process engineering, business models or the potential of platforms. Platforms create demand and

supply for new activities that previously were not possible, such as resource sharing – essential in order to be able to consume more while using scarce resources sustainably, as SDG 12 calls for. Indeed, most innovation stems from drawing on existing ideas, business models and technologies that are only new to the context – the country, sector, region – and adapted and modified as needed. In fact, among the fastest-growing small and medium enterprises (SMEs), relatively few are research-focused or technology-oriented. They include childcare providers using online platforms and applying brand development and modern customer-relationship management techniques; and construction companies experimenting with different building materials to lower heating costs in countries where energy subsidies are phased out.

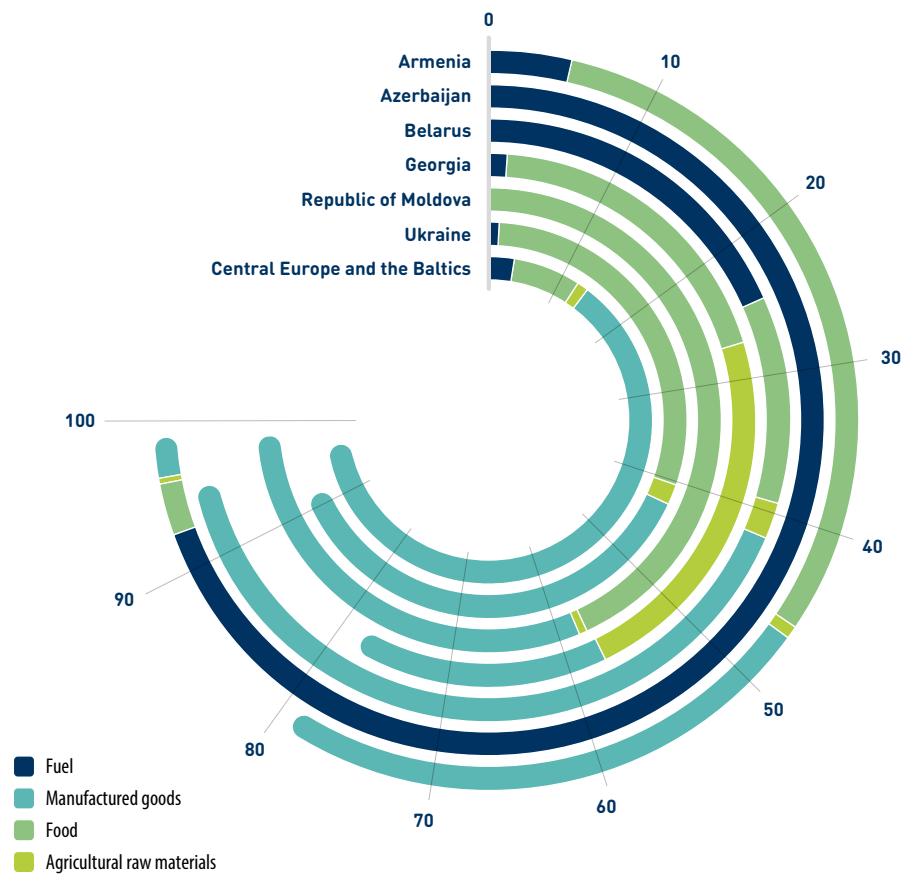
Despite several success stories, overall success does not happen systematically. The reasons, of course, are manifold, some of them discussed in this report: regulatory constraints, insufficient or no market competition in many sectors, modest but insufficient levels of organizational and managerial capacities among SMEs, the continued large role of State-owned enterprises (SOEs), strong and at times ineffective restrictions on FDI and poorly developed systems and markets for financial intermediation – especially the kind of equity mechanisms that are best able to finance the substantial risk that innovation entails.

Overreliance on commodities and domestic services hampers innovation for diversification and sustainable development

Dependence on a narrow set of commodities and trading partners not only limits growth prospects, but also amplifies vulnerability to economic and political shocks that will further deter investment into experimentation. These shocks include political instability, external crises, global sectoral trends and rapid price fluctuations, especially for natural resources and agricultural commodities. But the problem goes far beyond the risk of not sustaining solid export revenues. Such a production structure also limits abilities to build the broad productive capacities that are essential for innovation and diversification: expertise in harvesting grains or extracting oil is too specific to put to use in many other sectors, as a significant body of work on productive capacities and the product space shows (Hausmann and Klinger, 2007; Hidalgo et al., 2007).

The 2020 edition of the SME Policy Index for Eastern Partnership Countries (OECD and others, 2020) noted that EESC countries rely on a limited set of products and export markets and exhibit a low degree of export sophistication, a measure of the uniqueness and skill intensity of products exported. Compared with Central European countries, the product diversification index for EESC countries is higher (the higher the index value, the lower the degree of product diversification) – indicating a greater divergence from the world pattern. In Belarus and Georgia, the index even increased since 2008 (UNCTADstat, 2020). The lack of diversification and sophistication in merchandise exports (figure I.5 on the following page) is confirmed by data published in Harvard Growth Lab's Atlas of Economic Complexity database. The average sub-regional score on the 2018 Economic Complexity Index was -0.12 (with higher values indicating greater complexity in the products of the country's export basket). The average rank in the sub-region was 69th, out of 133 countries; Azerbaijan ranked lowest (124th) with a score of -1.37 and Belarus highest (29th) with a score of 0.89 (CID, 2020).

Figure I.5 · Merchandise exports by type, 2018
(Per cent of total merchandise exports)



Source: UNECE, based on data from the World Bank (2020a).

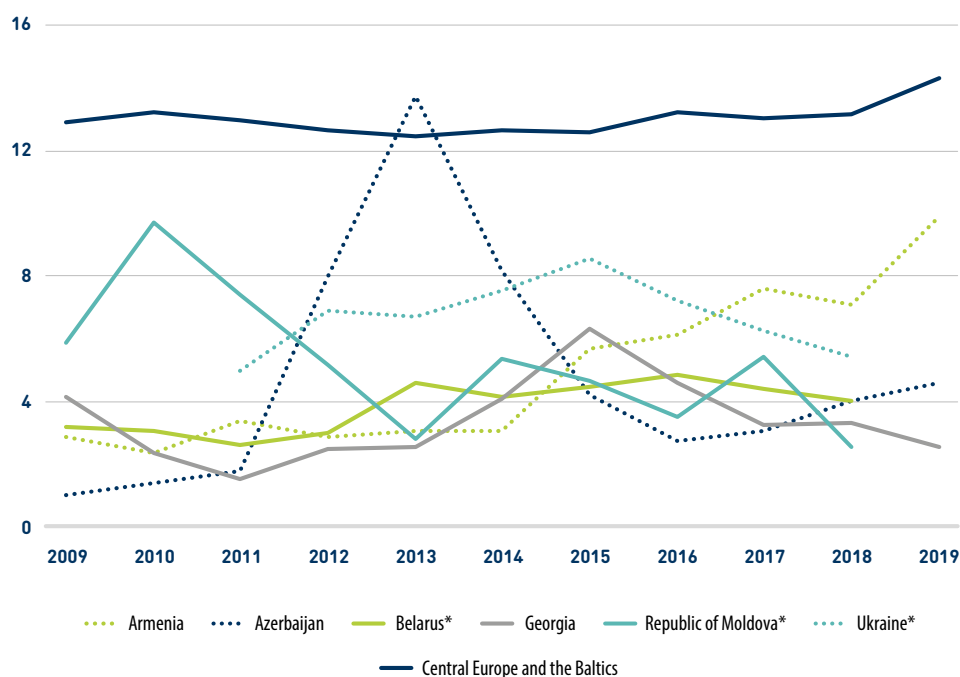
The structure, trends and target markets of EESC exports also reflect limited innovation – albeit with several promising exceptions

Merchandise exports from the EESC sub-region grew swiftly in the first decades after the fall of the Soviet Union but slumped and remained volatile following the global financial crisis and the 2014 Russian crisis, struggling to regain previous levels, let alone the export-to-GDP ratio of the EU and Central European countries. With overall export of goods and services accounting for 70.2 per cent of GDP in 2018, the highest ratio since 1993, Belarus is the only EESC country outperforming the average for Central Europe and the Baltics. With the exception of Azerbaijan and the Republic of Moldova, all other EESC countries see exports lingering below the level preceding the global financial crisis.

The composition of exports reflects the overall reliance on commodities with low levels of sophistication, such as cereals, natural resources and low-tech manufactured goods. High-technology exports account for less than 8 per cent of all manufactured exports for all six EESC countries, except Armenia (9.9 per cent in 2019). For Belarus, Georgia and the Republic of Moldova, the share is even lower (4 per cent and below).

Central Europe and the Baltics, which began the transition with similar characteristics to the EESC countries, see high-technology exports of 13 per cent – so the gap and future potential is significant and underscores the importance of innovation (figure I.6).

Figure I.6 · High-technology exports, 2009–2019
(Per cent of manufactured exports)



Source: UNECE, based on data from the World Bank (2020a).

Note: In 2013, the "Year of ICT" in Azerbaijan, the Government increased spending in the ICT sector with the establishment of the High-Tech Park, designed to foster the increased production and export of ICT (EC, 2014).

*Missing values for Ukraine (2009–2010; 2019), Belarus and the Republic of Moldova (2019).

FDI inflows create limited potential for innovation and other spillovers; exceptions point to substantial underused potential

Levels of FDI inflows are low, highly volatile and procyclical. After several peaks in the first decade of the century – hitting 19 per cent of GDP in Georgia following radical reforms in 2007, and a whopping 56 per cent in Azerbaijan as that country opened up to investors in oil extraction in 2003–2004, when world oil prices were high – FDI has stagnated (UNCTAD, 2020). Although Georgia attracted FDI worth 7.2 per cent of GDP in 2019, other countries are far behind, with the Republic of Moldova at 5 per cent, Belarus at 2 per cent and Armenia at 1.9 per cent (World Bank, 2020a). The underlying stories vary considerably: most FDI inflows are limited to a small set of source countries with which the country already had strong trade ties, with the notable exception of Georgia, which has a more diverse set (Gevorkyan, 2015). More than 60 per cent of Armenian FDI inflows were driven by diaspora connections between 1994 and 2004 (UNCTAD, 2019). The strong role of existing relationships and the relatively modest amount of market-seeking investment indicate a lack of dynamic, systematic exploration of market and investment opportunities.

Perhaps more important from an innovation perspective are the targets of FDI flows: to develop productive capacities, EESC countries need economic activities that create spillover effects, build skills and carry the potential for diversifying exports – broadly, these tend to be efficiency-seeking FDI (box I.1). The EESC sub-region falls short in this regard: with the notable exception of Azerbaijan which attracts resource-seeking investment in its extractive sector, FDI flows mainly into market-seeking opportunities, such as finance, construction, trade and to a lesser extent manufacturing for the domestic market, such as building materials. Narula and Guimon (2009) note that Eastern European countries are unlikely to attract significant investment into supply-driven R&D, manufacturing and capital-intensive technology. There are notable exceptions: an initial investment by a German automotive supplier into limited production in the Republic of Moldova, driven mainly by diaspora contacts, low wages, proximity to the EU and attractive conditions in dedicated economic zones, subsequently led to diversification and spin-offs into related products. Perhaps most prominently, most EESC countries, led by Armenia and Belarus, have seen the rapid rise of export-oriented ICT and business process outsourcing services (box I.2). Overall, however, these are the exceptions that prove the rule: FDI that gives rise to competitive, new sectors remains rare and often driven by circumstances and chance rather than by a broader dynamic of systematic experimentation with new ideas across the economy. As the current returns of foreign investment inevitably diminish, FDI and innovation policies must target, enable and promote the right kind of FDI and investment overall. A wide range of frameworks exist for shaping investment policies and incentives and developing bespoke investment promotion services, while monitoring impact carefully and continuously. An example is the UNCTAD Investment Policy Framework for Sustainable Development.

Box I.1

Not all FDI is created equal

Different kinds of FDI can vary radically in their potential contribution to innovation, diversification and sustainable development. The distinctions in the UNCTAD *World Investment Report* and in Dunning's framework are useful in this regard:

- Natural resource-seeking investment is driven by the potential to find and exploit resources in the country, such as oil in Azerbaijan. Such investment is capital intensive and can furnish substantial public revenue, but it creates few jobs and capacities that can be used to innovate and diversify, and often leads to countries falling prey to overreliance on mining exports as other sectors fail to compete and export revenue drives up the value of the local currency.
- Market-seeking investment seeks to fill gaps in supply in response to local consumer demand. It makes up most FDI in the EESC sub-region, filling sudden demand for construction, financial services, telecommunication and consumer goods. Although filling these gaps is important, such investment is unlikely to contribute to export diversification and may depend on unstable, debt- and remittance-fuelled consumer demand.
- Strategic asset-seeking investment is driven by interest in assets, such as brands, skills, linkages and customer bases. This is rare in transition economies.
- Efficiency-seeking investment aims to gain efficiency by producing, often in tradeable sectors and with export orientation. This kind of FDI has the largest potential to build capacities and skills, enable global value chain integration, generate positive spillover effects and, in some cases, develop entirely new sectors.

Broadly, encouraging efficiency-seeking FDI is important, and it has been the main driver in the development path of fast-growing countries over the past decades.^a

Sources: Dunning (1980), UNCTAD (1998).

^a Fruman, Cecile, *Why does efficiency-seeking FDI matter?*, World Bank Blogs, World Bank, 5 February 2016, <https://blogs.worldbank.org/psd/why-does-efficiency-seeking-fdi-matter>.

Box I.2 ICT success stories in the EESC sub-region

Whereas the digital prowess of countries such as China is recognized, that of the EESC countries is, with few exceptions, overlooked. As Gevorkyan (author of *Transition Economies*) and Sharpe^a note in a new study, ICT and the Fourth Industrial Revolution may provide new opportunities and a new development phase, as several initial successes show.

Armenia stands out. A high-tech and industrial centre of the Soviet Union, its ICT sector has grown at double-digit rates since the mid-2000s with over 800 ICT companies in software and fintech (such as the Enterprise Incubator Foundation); PicsArt, an Armenian photo-editing app, making the top five of the 2015 Forbes list of the year's hottest start-ups; and a range of global tech companies in the country, including the Microsoft Innovation Centre since 2011.

The ICT sector in Belarus has also grown exponentially over the past decade, employing over 85,000 people directly and an additional 30,000 IT specialists in other sectors, and seeing exports of IT goods and services grow from 0.16 per cent (2005) to 3.25 per cent of the total. Investment into services exports has been the main driver. In 2019, Gartner named Belarus among the nine most attractive locations for outsourcing and shared services in Europe, the Middle East and Africa.

Several challenges remain if the EESC countries are to bridge the gap with other transition economies such as Estonia (often called the world's most digital country and the birthplace of household names like Skype). The benefits remain relatively small and unevenly distributed: constrained supply has driven up salaries for programmers to levels that undermine the initial wage advantage, and the technology gap with the rest of the economy looms large. Financing and large customer bases are hard to come by, and many companies with potential tend to remain small. Outdated regulations affect the smooth use of technology for cross-border transactions.

Source: EY (2017).

^a Gevorkyan, Aleksandr V., and Norean R. Sharpe, How the digital economy is transforming Eastern Europe and the former Soviet Union, NextBillion.net, 20 September 2019, <https://nextbillion.net/digital-economy-transforming-eastern-europe>.

Stagnating momentum in governance, institutional and structural reform continues to restrain innovation and undermine sustainable development

In countries sharing similar economic, political and social challenges, opportunities, histories, and cultural and institutional characteristics whose legacy remains apparent, the transition towards market-oriented economies is well under way but far from complete and uneven, as the paths countries have taken often diverge. According to North (1990, p. 3), institutions are “the humanly devised constraints that structure human interaction”, including formal institutions (laws and regulations) and informal ones (conventions). The new institutional economics perspective put special emphasis on creating and preserving market-supporting institutions (such as property rights, commercial law and regulation of licensing, credit and the setting up of business enterprises), which are regarded as essential conditions for transition economies as well (Zeghni and Fabry, 2008).

The difficulty is apparent when looking at governance, institutions and structural reforms. In particular, building new institutions and reforming existing ones to meet the needs and dynamics of a market economy has been much more challenging than many initially assumed: the majority of existing institutions had to be remodelled and new ones established to fill gaps in areas such as macroprudential supervision and competition policy and in ensuring the rule of law and adequate protection for commercial transactions and investors. This took time: Berglöf and Bolton (2002) note that in the 1990s few countries managed to push through broad macroeconomic reforms and build effective market institutions. Many were wracked by conflict and political turmoil, and most either failed to restructure and privatize public assets and SOEs or made serious mistakes in doing so.

Box 1.3

Institutional legacy and path dependency as barriers to institutional reforms

Several authors point to weak and ill-fitting institutions in the EESC countries – often reflecting the Communist legacy of central planning and control of the economy – as barriers to development (Bevan and Estrin, 2004; Tidrico, 2006). Reluctance, lack of consensus and a range of entrenched interests make these barriers difficult to overcome in the sub-region. Globerman and Shapiro (2002) link economic success to the willingness and ability of local governments in particular. The speed of change also matters: Kyriazis and Zouboulakis (2005) point to the importance of the interaction between old and new values as an essential determinant.

Against this background, the notion of path dependency has come to the fore: “A path-dependent process is one possessing an asymptotic distribution that evolves as a function of the process’s own history” (David, 2007). Once a process (or outcome) settles in, it becomes progressively locked to external actors (of a group, network or system), resulting in a suboptimal development path. Spatial elements of path dependency explain the competitive advantages of different countries over time. An initial advantage of a country in one technology area, for instance, may strengthen this position through an “accumulation of experience”, while other countries without that advantage may be left behind.

Only in the 2000s did momentum pick up in earnest: EBRD transition indicators show significant improvement among the EESC countries in the period 2000–2014, albeit significantly behind those for Central Europe and the Baltics.

Over the past decade, however, this reform momentum has stagnated – indicative of a range of lingering impediments to economic diversification and innovation. To take a few examples: Low resilience adds layers of risk to all investment, especially into already risky, innovative projects. This is especially the case in Azerbaijan because of its overwhelming dependence on hydrocarbon exports, especially as prices dropped to record lows in the wake of recent price wars and the drop in demand following pandemic-related restrictions and income losses. Inadequate rule of law, insufficient investor protection and persistent corruption – all prevalent to varying degrees across the EESC sub-region – deter investors from risking substantial amounts of capital – one of the reasons why many have opted for the ICT sector, where large capital commitments are often not necessary. The large presence of SOEs inhibits productivity growth and incentives for private investment into those sectors. The absence of market competition inhibits new entrants and competition-induced pressure to increase productivity and diversify among incumbents.

Conclusion

To play an effective role in sustainable development, innovation policies must address constraints systematically and target support to encourage experimentation and risk-taking

The potential for innovation in the EESC countries is, in fact, very large – larger in some respects than in other countries at similar levels of development. Start, for instance, with education and research: Ukraine long boasted the highest levels of educational attainment in the labour force, with several other EESC countries not far behind – and a large portion of enrolment in scientific and technological fields of study. Despite gradual budget cuts, all countries have maintained the Soviet legacy of cutting-edge research

and a network of both basic and applied research institutions – many generating, but not systematically exploiting, findings that have commercial potential. With the stark exception of Belarus, many EESC countries started out with diversified production structures that they subsequently lost, though some of the productive capacities remain. Given the long time since independence, this potential is atrophying as skills are increasingly outdated or not used at all. Wage levels have risen but remain far below those of the EU, which should be attractive for efficiency-seeking FDI. Perhaps most importantly, all countries share strong societal and political commitment to innovation.

Looking ahead, opportunities abound. There is substantial potential in simply doing things better – streamlining organizations, using technology better, automating and upgrading. The past decades have opened up a range of opportunities for trade to meet demand in the EU, the Commonwealth of Independent States and Turkey, or for efficiency-seeking investment. Rapid technological advances, digitization, the platform economy and the broader implications that some call the Fourth Industrial Revolution open up the world for trade in services – often enabling entrepreneurs to circumvent some of the regulatory constraints or innovation system deficiencies that hitherto hampered innovation in the sub-region.

Overall, the volatility and stagnation of growth since 2009, exacerbated by a series of crises including the ongoing economic effects of pandemic-containment measures, clearly calls for action – especially regarding productivity-enhancing sectoral reallocation and respective policies. Innovation- and technology-based national development and policies play essential roles within this context, as they are the main drivers for a gradual move from less to more productive activities: technological upgrading (of the remaining production capacities), the generation of innovations and the support of knowledge-intensive (high value added) services.

This, of course, is not easy. It is not only a matter of reforming policies, institutions and processes – a notoriously difficult, long-term process that even star performers such as Georgia have managed only partially. More fundamentally, it requires a rethinking of the role of government altogether, as innovation is uncertain, risky and impossible to plan and foresee with any certainty. The 2006 report of the World Summit on the Information Society assembled leading experts from around the world but failed to mention mobile internet, big data, cloud computing and the platform economy – all of which rose to prominence just a few years later and now are essential to the world economy.

The fundamental question for innovation and related policies is then: how do we know what to do, and what do we put in our long- and medium-term strategic plans? What do we prioritize? And perhaps most importantly: How do we know what is working and what is not, and how do we make sure we have the data, incentives, and processes to systematically make sure we stop what is not working and scale up what does? In a sense, then, innovation is as important to policy and institutional design and reform as it is to the economy overall.

This recognition, shared by all EESC countries, lies at the heart of this report and its focus on how EESC countries design policies, institutions, processes and incentives rather than on their innovation inputs and innovation performance. This is especially true in the context of impending stagnation and rapid technological change, which remove some of the traditional development models that drove countries such as the Republic of Korea from post-war destitution to developed-country status in just a few decades (Amsden, 2001).

Note

- ¹ Gevorkyan, Aleksandr V., Roots of CEE economic success were planted in postwar industrialisation, *Financial Times* (North American edition), 14 June 2019.

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Chapter II

INNOVATION PERFORMANCE OVERVIEW: SUB-REGIONAL TRENDS AND FINDINGS

Innovation climate across the EESC sub-region

Since their independence, the EESC countries have embarked on a journey of economic liberalization and growth amid their transition from planned to market economies. The challenge now is to sustain and accelerate growth in productivity, while reducing the economic inequality and vulnerability to external shocks that came in the wake of market-oriented reforms (chapter I). Innovation plays a crucial role in addressing this challenge and enabling a resilient and sustainable post-COVID-19 recovery while also promoting the transition to circular economy.

This chapter gives an overview of the innovation performance of the EESC sub-region. It first discusses innovation outcomes – the amount and quality of innovation that is being generated. It then discusses the scope and quality of the underlying innovation activities that led to these outcomes. The innovation performance of the EESC countries corresponds broadly to their levels of economic development. In part because of rising ICT exports, some have even been classified as innovation achievers relative to their income group level in the Global Innovation Index (GII; box II.1). However, to take the next step and to fully develop innovation capacities, the EESC sub-region needs to mitigate skills mismatches on the labour market, strengthen technological competitiveness, expand absorptive capacities, attract more FDI, and deepen university and business linkages.

Innovation outcomes

Innovation outcomes can be assessed along a number of dimensions, reflecting the different types of innovation and ways of generating value from them. This section discusses a range of quantitative indicators that shed light on these dimensions and that are publicly available and comparable across countries.¹

Technological and non-technological innovation can be proxied by the share of medium- and high-technology outputs in the manufacturing sector and the creative outputs indicator of the GI (Cornell University, INSEAD and WIPO, 2019), respectively.

Process and organizational innovation and the ability to move up in value chains can be proxied by the number of ISO 9001 quality certificates. The extent to which domestic innovation is internationally competitive – that is the quality of innovation, can be proxied through indicators such as net exports of high-technology manufactured goods, ICT services exports and revenues generated from licensing intellectual property abroad.

Between 2013 and 2019, the EESC sub-region made progress on ICT services exports and international quality certification (figure II.1). By contrast, there was a decline in creative outputs across the sub-region, and medium-and high-technology manufacturing outputs, high-technology exports and intellectual property revenues from abroad all remained stable.

Despite progress in some areas, the sub-region ranks in the top half of the countries covered by the GII only for ICT services exports. For the other five indicators considered here, innovation outcomes remain moderate on a global scale (table II.1). Overall, these indicators suggest that the region has been relatively successful at carving out a niche in the international market for ICT services, with Ukraine, Armenia, the Republic of Moldova and Belarus (in that order) ranking in the top 20 in the 2019 GII, but that it still struggles to produce internationally competitive innovation in other sectors.

Box II.1 The Global Innovation Index

For more than 10 years, the Global Innovation Index (GII) report – co-published by Cornell University, INSEAD and the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations – has identified global innovation trends and measured the innovation performance of about 130 economies. It has been influential on three fronts.

First, as part of their economic policy strategies, policymakers now refer regularly to innovation and their innovation rankings. Officially, the GII is considered a yardstick for measuring innovation, as noted by the UN General Assembly in its resolution on the importance of science, technology and innovation for achieving the Sustainable Development Goals (SDGs) at its 74th session in 2019.

Second, the GII allows policymakers to assess the innovation performance of economies. They invest resources to analyze their GII results in cross-ministerial task forces and use the GII to design appropriate innovation and intellectual property policies. This assists them in evaluating the innovation performance of the economy and in making informed decisions on innovation policy.

Third, the GII gives strong impetus for governments to prioritize and collect innovation metrics.

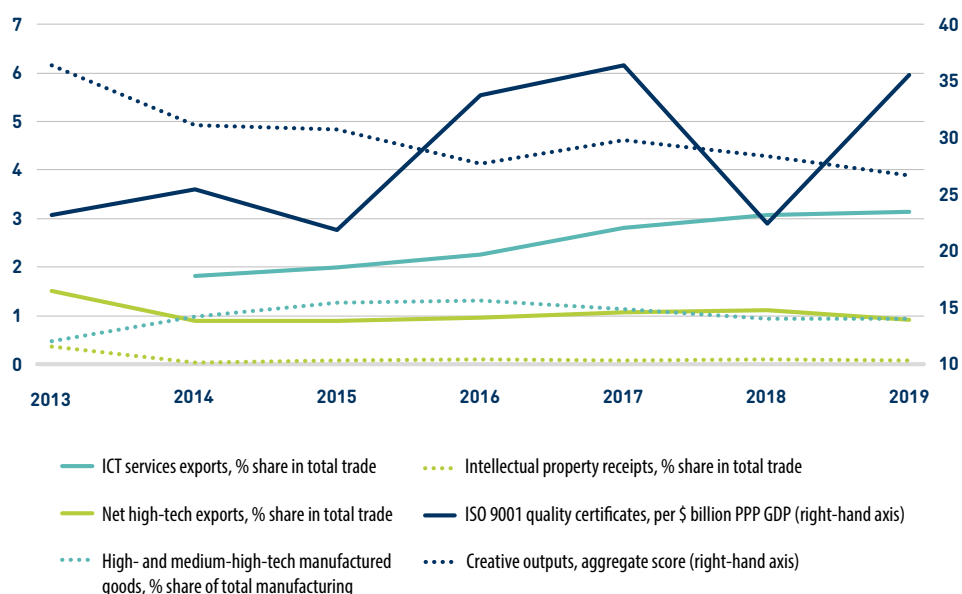
The report shows the positive relationship between economic development (as measured by GDP per capita adjusted for purchasing power parity (PPP)) and innovation performance (as measured by the GII). It identifies innovation achievers whose innovation performance exceeds their level of economic development.

The IPO assessment, conducted in 2019 and 2020, draws on the 12th edition, *Creating Healthy Lives – The Future of Medical Innovation*, which focuses on the medical innovation landscape, examining how (non-)technological medical innovation will change the delivery of health care around the world. In 2020 the GII presented its 13th edition, titled *Who Will Finance Innovation?* This edition sheds light on the state of innovation financing by investigating the evolution of financing mechanisms for innovators and by pointing to progress and challenges—including in the context of the COVID-19 crisis.

The report can be downloaded at <https://globalinnovationindex.org>.

Source: WIPO.

Figure II.1 • Innovation performance by selected GII indicators, 2013–2019 (average values)



Source: UNECE, based on data from Cornell University, INSEAD and WIPO for 2013–2019.

Note: The decrease in the sub-regional average for ISO 9001 quality certificates is due to a drop in value for Belarus from 21.7 certificates per \$1 billion PPP GDP in 2017 to 1 certificate per \$1 billion PPP GDP in 2018. As reported in the 2018 GII, the values for Belarus in 2018 are methodologically constrained owing to the estimation of missing data and changes in the weights and aggregation of the formulas used.

Table II.1

Innovation outcomes by selected GII indicators in the EESC sub-region, scores and ranks, 2019

Country	Creative outputs		High- and medium-high-tech manufacturing		ICT services exports		Intellectual property receipts		ISO 9001 quality certificates		Net high-tech exports	
	GII aggregate score	GII rank	Per cent of total manufacturing output	GII rank	Per cent of total trade	GII rank	Per cent of total trade	GII rank	Per \$1 billion PPP GDP	GII rank	Per cent of total trade	GII rank
Armenia	32.2	48	4	96	4.3	15	0	109	1	107	0.6	77
Azerbaijan	22.8	84	10	79	0.4	107	0	108	1.2	104	0.1	115
Belarus	10.8	126	30	45	4	19	0.1	59	22.2	14	1.8	57
Georgia	29.1	58	10	91	1.1	80	0	90	3.3	74	0.3	90
Republic of Moldova	31.8	49	10	71	4.2	18	0.1	45	4.6	60	0.7	74
Ukraine	33.5	42	20	56	4.8	11	0.2	43	3.5	70	2	53

Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).

In Armenia the improved regulatory environment for enterprises has spurred the growth of ICT, although access to ICT remains comparably limited. The contribution of the ICT sector to GDP in Belarus has increased significantly, mainly because of its strong ICT infrastructure. A substantial amount of Georgia's high-technology output also originates from the ICT sector. As one of the main drivers of economic growth in Ukraine, the sector shows great potential for further development. In contrast, in the Republic of Moldova growth in the sector has stagnated since 2014, and in Azerbaijan the ICT sector contributes comparably little to GDP as the oil sector dominates the economy. Within countries, the benefits of the growing ICT sectors remain unequally distributed, as connectivity remains low due to persistent technology gaps.

In part thanks to ICT-enabled content, creative outputs are an area of relative strength for most of the EESC countries (see table II.1). In some, such as the Republic of Moldova and Ukraine, exports of creative outputs may also have contributed to relatively strong revenues from intellectual property licensing abroad. By contrast, technological innovation outside the ICT sector is not a strength of the sub-region, as only approximately 13 per cent of manufacturing output in the EESC countries are high-tech and medium-high-tech (with an average GII rank of 73). The only two countries that have relatively high technology content in their manufacturing output are Belarus and Ukraine. Particularly in Belarus, this results from a relatively strong capacity for process innovation, as indicated by ISO 9001 quality certificates in 2019. But even in these two countries, the share of high-tech exports in total trade remains modest, indicating that technological innovation is often not internationally competitive.

Innovation activity – channels, strengths and weaknesses

Innovation outputs result from the innovation-related activities of enterprises, supported by the innovation ecosystem. On average, only about 15 per cent of the firms in the EESC sub-region report undertaking innovations of any kind, whether product, service, process or organizational innovations, and irrespective of whether these innovations are new to the world, new to the economy, new to a particular sector or only new to the firm introducing them.² In contrast, an average of over 50 per cent of firms are innovation-active firms in the 28 member States of the European Union (EU), with an average of over one-third in 13 of the member States that joined the Union in and after 2004.

Among the key factors that determine innovation outcomes are the degree of knowledge absorption – particularly from abroad, the creation of knowledge domestically, and the managerial and technical skills needed to transform knowledge into innovative products and services. This section sheds light on these factors by presenting a range of relevant quantitative indicators that are publicly available and comparable across countries. Foreign knowledge transfer operates through three main conduits: transferring knowledge in the course of FDI, importing more advanced machinery and equipment, and licensing foreign intellectual property for domestic application. Domestic knowledge creation in turn depends on investment in R&D and on academic research, and on the links between industry and science that make it possible to commercialize this research, whereas skills development requires spending on education and vocational training.³

International knowledge absorption

Openness to trade, FDI and knowledge flows translates into greater capacity to absorb and adapt foreign technologies and improve their economic competitiveness. On the global scale, the EESC countries rank relatively low with regard to international knowledge absorption (table II.2). In the 2019 GII, the best performer in the sub-region was Ukraine, followed by Georgia and the Republic of Moldova. In terms of channels of knowledge transfer, Georgia and Azerbaijan have been particularly successful at attracting FDI, and this channel seems to be somewhat more important overall than imports of machinery and equipment. Imports of foreign knowledge through the licensing of intellectual property do not play a prominent role in any of the six countries so far.

Table II.2 Knowledge absorption indicators in the EESC sub-region, GII scores and ranks, 2019

Country	Knowledge absorption		High-technology imports		Inward FDI	
	GII aggregate score	GII rank	Per cent of foreign trade	GII rank	Per cent of GDP	GII rank
Armenia	22.4	114	4.8	109	2.4	74
Azerbaijan	22.9	113	2.8	124	8.8	15
Belarus	25.1	101	5.1	104	2.6	63
Georgia	31.4	78	7.5	63	11.6	11
Republic of Moldova	30	82	7.4	66	2.2	77
Ukraine	31.7	73	8.8	46	3.2	52

Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).

Investment in R&D

Both public and private investments in R&D are necessary to create innovative products and processes and spur sustainable economic growth. Overall investment in R&D in the sub-region is low (table II.3 on the following page). Although the expenditure of the public sector is well documented in all countries, significant data gaps exist with respect to private sector R&D spending in Armenia and Georgia, which may lead to overall spending being underestimated. Business sector R&D spending is relatively high in Belarus, a finding that dovetails with the relatively big contribution of medium- and high-tech goods to manufacturing output there. A relatively large share of R&D is financed from abroad in Ukraine, Georgia and Belarus. This reflects the participation of research institutions in EU framework programmes, but also to some extent contract research for foreign companies, particularly in the ICT sector, and the activities of subsidiaries of foreign parent companies.

Despite some efforts, university-business linkages and networks in the EESC sub-region remain underdeveloped (chapter IV). According to the indicator for university and industry collaboration in the 2019 GII, collaboration is strongest in Azerbaijan, followed

by Ukraine, Armenia, Georgia and the Republic of Moldova. The number of international co-publications is highest in Armenia, Georgia and the Republic of Moldova (EC, 2019). For the EESC countries to capitalize on their research heritage, stronger linkages are needed between academia and the private sector, to further support knowledge sharing and more efficient commercialization of new products and processes.

Table II.3

Investment in R&D and university-industry collaboration in the EESC sub-region, GII scores and ranks, 2019

Country	Gross expenditure on R&D		Gross expenditure on R&D financed from abroad		Gross expenditure on R&D financed by business		University and industry collaboration	
	Per cent of GDP	GII rank	Per cent of gross	GII rank	Per cent of gross	GII rank	GII score	GII rank
Armenia	0.2	86	1.7	82	..	..	36.3	89
Azerbaijan	0.2	90	0.1	100	32	56	54.2	32
Belarus	0.6	54	14.1	29	43	41	..	..
Georgia	0.3	79	14.7	28	..	..	32	98
Republic of Moldova	0.3	78	3.7	67	17.9	70	29.1	109
Ukraine	0.4	67	24.2	15	30.1	59	41.3	64

Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).

Skills development

Despite significant cross-country variation, human capital remains a strength of the EESC sub-region overall relative to its level of economic development. However, more needs to be done to maintain and update existing human capital as skills do not always match labour market requirements and innovation-specific skills both at the managerial and the production level are often insufficient – a major reason why many enterprises in these countries struggle to absorb knowledge, to cooperate with scientific institutions, and to innovate successfully.

The level of expenditure on education in the sub-region ranges from less than 3 per cent to over 6 per cent of GDP, such as in the Republic of Moldova, a very high level even by global standards (table II.4). There are significant differences in the allocation of this spending. The Republic of Moldova for instance has a relatively low tertiary enrolment rate, suggesting that its spending is focused on primary and secondary education. Tertiary enrolment rates are particularly high in Belarus and Ukraine. These two countries also rank highest among the EESC countries in the Quacquarelli Symonds ranking of university quality.

However, underdevelopment of managerial skills impede innovation, particularly in State-owned enterprises (EBRD, 2020), and few firms, with the exception of Belarus, offer formal training to employees in 2019.

Table II.4 Skills development in the EESC sub-region, GII scores and ranks 2019

Country	Expenditure on education		Quacquarelli Symonds		Gross share of tertiary enrolment		Firms offering formal training to employees	
	Per cent of GDP	GI rank	GI score	GI rank	Per cent of tertiary-education-age population	GI rank	Per cent of all firms	GI rank
Armenia	2.8	111	0	78	52.2	54	16.2	82
Azerbaijan	2.9	103	3.7	72	27.1	87	20.2	74
Belarus	4.8	53	14.8	57	86.7	11	51.1	19
Georgia	3.8	85	0	78	57.5	50	10.5	88
Republic of Moldova	6.7	11	0	78	41.1	70	32.4	46
Ukraine	5	48	22	46	83.4	14	22.6	69

Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).

Synthesis

This table summarizes the main achievements of and challenges to R&D and innovation (RDI) across the EESC sub-region, based on the findings described in this chapter.

Progress made so far

- Good overall innovation performance relative to the level of economic development.
- Fast growth of the ICT sector as a significant contributor to economic growth and growth in ICT services exports.
- Relatively strong performance on creative outputs.
- Improvements in business skills, as evidenced by more enterprises receiving international quality certification.

Challenges ahead

- Linkages between universities and the business sector remain underdeveloped.
- Investment in R&D in both the public and private sector remain low, hindering the exploration of innovative products and processes.
- Human capital is not fully exploited because of a lack of investment in skills training for the labour force.
- Knowledge transfer has room for further improvement by attracting higher levels of inward FDI.

Notes

- ¹ For more in-depth assessments of the innovation performance of individual countries, see the UNECE's national innovation performance reviews of Armenia, Belarus and Ukraine and the Innovation for Sustainable Development Review of Georgia (forthcoming): <http://www.unece.org/innovationforsustainabledevelopmentreviews.html>.
- ² See the discussion of survey evidence in the country chapters. The data are drawn from national and international surveys, which differ somewhat in their methodologies and cover different years between 2017 and 2019. Belarus shows the highest share of innovation active firms among the six EESC countries, at 24.5 per cent.
- ³ UNECE (2007), *Creating a Conducive Environment for Higher Competitiveness and Effective Innovation Systems – Lessons Learned from the Experiences of UNECE Countries*. United Nations. New York and Geneva. <http://www.unece.org/fileadmin/DAM/ceci/publications/icp.pdf>.

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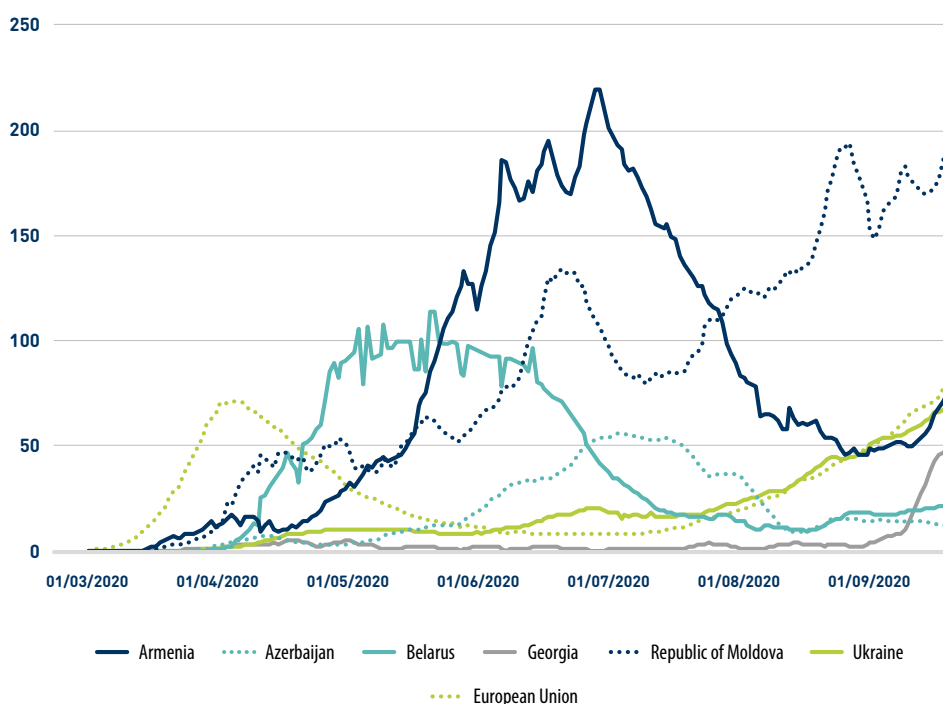
Chapter III

EESC ECONOMIES IN THE FACE OF THE COVID-19 PANDEMIC

Socioeconomic impact on the sub-region

The COVID-19 pandemic and the associated lockdown measures have significantly affected the economies and societies of the six countries of the EESC. Infections started to occur in March 2020 and rose quite rapidly in the following months. From June to August 2020, new cases tended to decline; however, as of the end of September, all except Azerbaijan were experiencing an increase again. This included the two countries that did not have large caseloads initially: Georgia and Ukraine (figure III.1).

**Figure III.1 · COVID-19 cases, EESC sub-region and EU,
March–September 2020**
(Per million population, seven-day moving average)



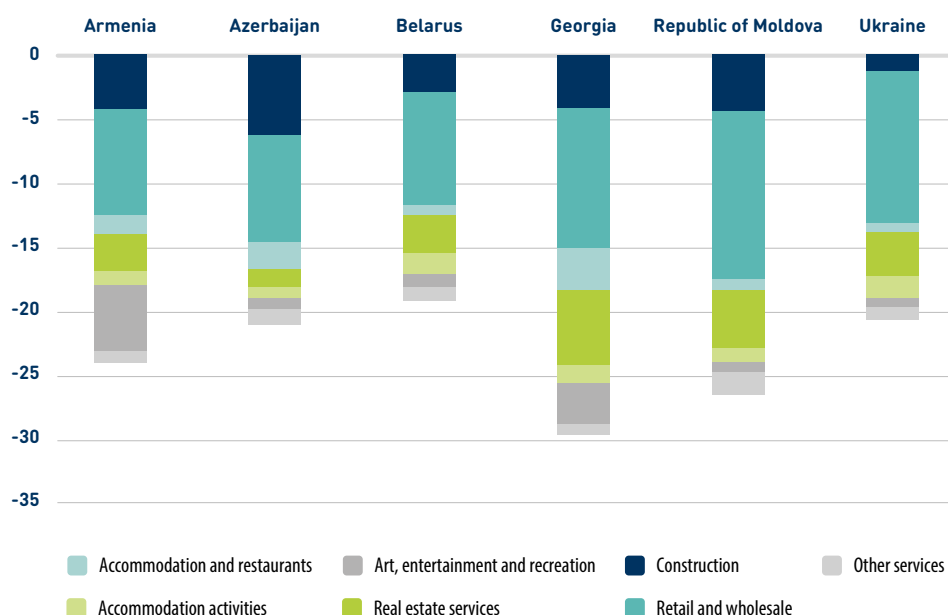
Source: UNECE, based on data from WHO (2020b) and the World Bank (2020).

Governments responded to the pandemic by introducing a variety of containment measures, including closures of educational establishments, shutting down of restaurants and stores of non-vital significance, restrictions on public gatherings, social distancing measures and restrictions on intraregional and international mobility. Containment strategies have varied across countries, with Georgia introducing relatively far-reaching restrictions early on and Belarus taking the least restrictive approach. Some restrictions were lifted subsequently, in part in response to declining infection rates and in part in an effort to limit the negative impact of restrictions on economic activity. As cases were rising again at the time of writing, it had become clear that a return to normal would not be possible for quite some time.

Although global growth has been projected at –4.9 per cent in 2020 because of the pandemic (IMF, 2020c), the economic impact of COVID-19 on the EESC countries has been estimated as a range from –1.5 per cent (Armenia) to –7.7 per cent (Ukraine) in real GDP growth in 2020 (IMF, 2020b). According to estimates by the Organization for Economic Cooperation and Development (OECD) of the potential immediate impact of containment measures on the EESC economies, the sectors most affected by the pandemic – tourism and proximity services – accounted for 30–40 per cent of total output. Retail and wholesale trade, construction and real estate services bore the highest costs. The slowdown of global economic activity, and in particular trade with major partners such as the EU and the Russian Federation, as well as the decrease in remittances, which account for up to 10 per cent of GDP in Armenia, Georgia, the Republic of Moldova and Ukraine, have all contributed to economic decline. Increased government spending in response to the pandemic and declining tax revenues because of it have led to widening budget deficits and greater pressure on public finances, against a backdrop of shrinking reserves and foreign currency assets across the sub-region (OECD, 2020).

The pandemic has also had an important negative social impact on EESC economies that are characterized by high levels of informality¹ and unemployment, as well as low household savings and high reliance on remittances. This has left a significant proportion of the population highly vulnerable to the crisis induced by the pandemic.² For example, the share of vulnerable workers who have limited access to traditional forms of income support is particularly high in Azerbaijan, Georgia, the Republic of Moldova and Armenia (OECD, 2020). In addition, those employed in the informal sector cannot count on teleworking arrangements and State support, and they often have no or low personal savings. They are therefore often obliged to continue working on-site even where social distancing measures are inadequate, thus increasing their risk of infection. If in normal times the informal economy acts as a hedge against economic downturns, the unprecedented nature of the pandemic-induced crisis, resulting in lockdowns and border closures, hit hard the sectors in which informality is prevalent, such as proximity services, cross-border trade and transport. In this regard, EESC governments are confronted with a double challenge when designing health measures and administering support policies to households and businesses: supporting not only the formal economy but also the informal sector, and developing, to the extent possible and given the scarce data, targeted support for those employed informally and most likely being disproportionately affected by the pandemic. More generally, the digital divide – the fact that in many countries a significant part of the population does not have adequate access to

Figure III.2 · Potential impact of containment measures on activity in EESC countries (Per cent of GDP)



Source: OECD (2020).

Note: These estimates are based on the methodology for estimating the impact of the containment measures on output in OECD countries.

the internet – has become an even more pressing issue during the pandemic than it was before, as workers who lack connectivity are more likely to be exposed to health risks because they cannot telework and are more likely to lose their jobs entirely, and students who lack connectivity risk falling behind in their education.

Economic and social policy responses in the EESC sub-region

EESC governments have put in place policy measures to cushion the immediate socioeconomic impact of the pandemic. By helping businesses avoid bankruptcy and mass layoffs, some of these measures may also support the recovery of economic activity once the pandemic is under control. By contrast, there is little evidence so far of policies aiming to lay the groundwork for building a more sustainable economy in the medium and longer term. Along with health measures, governments have provided financial support to businesses, including through tax relief packages targeting small and medium enterprises (SMEs) and support for selected sectors (for example, tourism in Georgia, agro-food in Armenia), subsidizing salary payments and increased social assistance to households and vulnerable groups of population (for example, for obtaining necessary supplies). Some countries, such as Armenia and Georgia, passed legislative amendments to increase employee protection and promote remote work. EESC countries have adapted their monetary policy to respond to the pandemic and have benefited from large amounts

of donor support (such as loans from the EU, the European Bank for Reconstruction and Development (EBRD) and the World Bank). The governments have also established dedicated platforms to provide citizens with current information on the situation (table III.1 offers more detail on economic and social policy responses).

Table III.1 COVID-19 policy responses of EESC countries

Country	Fiscal support	Salary policy	Social policy	Business support policy
Armenia	\$3 billion	Partial wage subsidies	Increased benefits, one-off transfers to specific population groups, utility payment support	Subsidised two- to three-year loans to affected businesses and SMEs, direct subsidies to SMEs and businesses to help maintain employees, grants to entrepreneurs and firms
Azerbaijan	\$1.5 billion	Partial salary subsidies	Increased benefits, one-off additional social payments to certain individuals	Tax exemptions and tax payment deferrals, loan guarantees
Belarus	\$2–2.5 billion announced ^a	Partial wage subsidies, salary bonus for health care workers	Increase in other benefits, ^b price controls for medical masks and disinfectants	Certain loan payment holidays, rent payment deferrals, tax relief measures
Georgia	\$1.1 billion	Partial wage subsidies, financial assistance to those who lost their jobs	Increased benefits, one-off and recurring payments for certain population groups, utility payment support	Credit guarantee scheme of GEL 330 million, interest rate subsidies, tax exemptions and deferrals, grants, accelerated value added tax refunds and exemptions (medical goods), targeted support (e.g. co-financing mechanism for small and medium family hotel industry)
Republic of Moldova	\$2.7 billion	Partial wage subsidies, unemployment benefits increased (by 55 per cent)	Increased benefits (e.g. minimum amount of “guaranteed monthly income” for low-income families increased by almost 20 per cent)	Tax relief for affected sectors, tax payment deferrals, suspension of tax audits and controls, VAT refund programme (1 May–31 December 2020) of LEU 1 billion (\$56 million), grants and co-financing of interest rates, exemptions from patent payments
Ukraine	\$2.4 billion	Increased salaries for medical personnel, partial wage subsidies	Increased benefits, one-off payments to certain groups of population, utility payment support, price regulation for certain goods	Cancellation of tax payment penalties, moratorium on tax audits and inspections, tax exemptions and deferrals, expansion of 5-7-9 subsidized loans programme for SMEs

Sources: IMF (2020a); OECD (2020); Gevorkyan (2020); UNECE (forthcoming a and b).

^a This amount includes \$0.7 billion allocated under Presidential Decree No. 178, “On temporary state support measures of employers and certain categories of population” (Belarus, President, 2020).

^b For example, delivery of food and medicines to elderly and persons with disabilities, and care leave to workers with children under 14.

Innovation policy responses to the pandemic

Innovation can play a crucial role in addressing the unprecedented challenges caused by COVID-19.³ It is essential for finding solutions to cope with the pandemic itself and with the immediate impact of the associated lockdown measures. It is also essential to ensure longer-term recovery, to build back better, in line with United Nations Agenda for Sustainable Development 2030.

In fact, one of the lessons of past crises is that successful innovators are the ones who thrive, not only once the crisis has been overcome, but often already during the crisis. Beyond the general decline in economic activity and the pattern of different sectors being affected to differing degrees, a closer look reveals a differentiated picture where even within the same sector, some companies succeed in creating or scaling innovative products, services and business models that respond to the new economic realities created by the pandemic and the lockdown measures. At the same time, many companies respond to crises by scaling back investment, including in RDI, in part because they shun the risk, but also often because of liquidity constraints.

Experience suggests that governments have a key role to play in sustaining innovative activity during crises. Governments, including in the six countries under review here, continue to mobilize considerable fiscal resources to cushion the short-term blow from the pandemic. By allocating some of these resources to innovation support measures, rather than to measures preserving existing businesses only, and in particular by supporting innovation in fields that enhance sustainability, governments can in principle counteract the immediate negative effects of the pandemic while supporting a more sustainable future.

The EESC countries have put in place innovation policy responses to cope with the crisis, mobilizing the innovation ecosystems to find solutions to pandemic-induced challenges. Thus, consultations were held within the framework of the national science, technology and innovation (STI) institutions, such as the State Committee on Science and Technology (SCST) (Belarus), the National Academy of Sciences (Ukraine) and the Ministry of Education (Republic of Moldova), with initiatives to create viable solutions by increasing COVID-related medical research, including through grants. At the same time, a lack of State funding and heavy reliance on donors for the implementation of these undertakings can put their sustainability in question.

With State support, a number of initiatives for innovative companies have been launched, seeking to use their potential in addressing health care and other challenges caused by the pandemic. Dedicated hackathons called “coronathons” were held by Georgia’s Innovation and Technology Agency, and in Ukraine with the support of the Ministry of Digital Transformation. In Armenia, the Ministry of High-Tech Industry (MoHTI) announced a grant programme for innovative solutions for combatting and preventing the spread of COVID-19. As a result, new masks, respiratory devices, public e-services and IT solutions have appeared across the EESC countries. In the Republic of Moldova, a national COVID-19 platform gathering about 50 R&D solutions was established and several IT companies have developed a monitoring tool for quarantined people.

The pandemic has also prompted investment in fintech in Azerbaijan, as a few banks announced the establishment of dedicated tools (for example, the Innovation Centre of the International Bank of Azerbaijan), and the Government has expressed its resolve to accelerate efforts to bridge the digital divide through innovative solutions and greater engagement of the private sector in this regard.

When it comes to general enterprise dynamics in the context of the pandemic, the EESC countries have witnessed companies introducing innovations in marketing and organization methods and increasing their investment in digitalization to allow for remote operations and sales. The IT sector, which has been relatively strong in the sub-region, has not seemed to suffer from the crisis, with some companies experiencing growth in sales and revenues, as well as in the number of employees.

Going forward

As the recovery prospects for the EESC countries vary from more optimistic predictions of V-shaped recovery by the International Monetary Fund (IMF) and the EBRD to more pessimistic expectations of a possible L-shaped scenario by national stakeholders,⁴ one thing is sure: governments should step up their efforts to support and promote innovation activity in the sub-region to ensure an efficient and sustainable long-term recovery. As first steps, EESC policymakers could consider the following:

- Enhancing efforts to bridge the digital divide across the sub-region and establishing an inclusive digital economy would help to cushion the effects of this and potential future crises.
- Moving forward with the implementation of structural reform to regain declining investor confidence and attract investment that drives technology and knowledge transfer should be high up on the COVID-19 policy agenda for EESC governments.
- Providing new opportunities for industry-science collaboration in various areas, including regional initiatives, could also help develop solutions for and better anticipate future shocks, while collective efforts hold great potential for addressing common regional challenges in innovation.
- A dedicated platform that builds on the national and international practices in innovation policy responses would help EESC governments to exchange experiences and share knowledge, as well as to establish regional mechanisms and tools for sustainable post-pandemic recovery. The IPO has an important role to play in this regard in gathering important expertise and knowledge of the EESC sub-region and providing a platform for discussions for innovation policymakers from the sub-region and beyond.

Notes

- ¹ According to IMF estimates, the size of the informal sector varies from 30 per cent of GDP in Belarus to 50 per cent in Georgia.
- ² Vulnerable workers are self-employed individuals without employees or contributing family workers.
- ³ The information for this section is based on desk research and a series of dedicated interviews conducted in June–July 2020 with national experts from the six EESC countries.
- ⁴ Based on the interviews conducted by UNECE in June 2020 with public and private stakeholders from the EESC sub-region.

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Chapter IV

INNOVATION POLICY GOVERNANCE: SUB-REGIONAL TRENDS AND FINDINGS

This chapter describes recent developments in the EESC countries in innovation policy and governance. All EESC countries have established ambitious goals for enabling innovation-led sustainable development. Considerable progress has been achieved in establishing new institutions with responsibilities for science and innovation and improving legal frameworks for entrepreneurship and innovation activities. Yet, in most EESC countries legal gaps still hinder the growth of innovation-led sustainable development. Special areas of concern include venture capital investment, insolvency and FDI. National institutional frameworks are still nascent. Therefore, institutions often lack clear mandates and coordination mechanisms. Innovation policymaking remains fragmented, decreasing the efficiency and effectiveness of policy interventions. Over the last five years, the EESC countries have launched new national strategies oriented to supporting innovation, education and industrial development. To maximize the impact of policy initiatives, these countries need to foster synergies among different policy domains and strengthen positive socioeconomic externalities.

The importance of sound innovation policy governance for EESC countries

Innovation-led sustainable growth requires a system that allows, encourages and rewards experimentation with new ideas. Such innovation results from interaction among governments, businesses, research institutes and individuals within a national innovation system that systematically enables and promotes experimentation with new ideas. Central to innovation policy is to develop and enhance such systems, supporting not only the generation but also the implementation, scale-up and proliferation of innovative ideas across the economy and government (Borrás and Edler, 2020). This makes it imperative for policies and institutions to enable and encourage networking among innovation stakeholders and to remove regulatory bottlenecks that inhibit knowledge-sharing and the co-creation of value.

Such systems, as chapter I notes, require substantial development in the sub-region. Such development includes but extends far beyond the remit of innovation policies on research, technology and start-ups. This extension, in turn, relies on careful and systematic alignment, coordination and synergies among policies and institutions across domains from education to infrastructure and procurement to the private sector (addressing SMEs, industry, regional development and entrepreneurship).

Full-fledged national innovation systems require strong yet flexible and transparent institutions with clear mandates. Rule of law, sufficient legal protection and clear rules of the game are the foundation of such efforts, but countries also need a layer of innovation intermediaries to enable and encourage experimentation and interaction. Much potential will lie in unexpected sectors and policy areas – given, for instance, the significant demand inherent in public procurement (more than 10 per cent of GDP in the sub-region), the opportunity to use it as a driver of innovation is substantial (OECD, 2015). This opportunity remains unexploited in the sub-region, barely featuring in the innovation or procurement strategies and action plans of any of the six countries.

Sound governance of innovation is essential for sustainable development. Such governance rests on the ability to efficiently allocate available resources with maximum impact and to systematically align support with long-term priorities, such as the SDGs. National governments need to systematically enable and encourage innovation as the leading means to create and scale up the elements that will underpin long-term, sustainable development.

The pillar I assessment framework

Pillar I, innovation policy governance, assesses the quality of innovation policies and institutions across the six countries in the EESC. It covers the overarching institutional and legal framework, policy coordination and institutional capacities. The first sub-pillar, which pertains to the innovation policy framework, assesses the nature, objectives and complementarities of the system, showing its links with overarching and related strategies and objectives; the nature, consistency and robustness of targets, links and mechanisms for implementation; and the overall legal and institutional frameworks. The second sub-pillar, on innovation policy coordination, looks at the structure and mechanisms for aligning and coordinating policies relevant to the broader innovation system – across ministries, levels of government, levels of implementation and internationally.

Sub-regional findings

National innovation strategies

All EESC countries espouse strong political and societal commitments to innovation and education as being central to sustainable development. This can be clearly seen through the flourishing of initiatives to put in place comprehensive innovation policies and strategies, to improve and streamline the regulatory environment, and to set up new institutions. Among recent or ongoing initiatives:

- Armenia is developing a national innovation strategy that will prioritize research areas and industrial sectors and unite national stakeholders.
- As part of its broad drive for economic diversification, Azerbaijan is planning to adopt a national innovation strategy in 2020, seeing it as central to achieving the SDGs.

- The Belarusian National Science and Technology Strategy 2018–2040 seeks to strengthen the research base in the country and lay the foundations for innovation-led economic growth, while regular technology foresight exercises inform programming (with support from UNECE).
- The national innovation strategy for Georgia, slated for adoption in 2020, aims to boost innovation by building on strengths and potential – encompassing policy areas beyond research and technology start-ups in a single document for the first time.
- The Republic of Moldova’s National Programme for Research and Innovation, adopted in August 2019, unifies previously fragmented elements of innovation policy, fostering synergies among them.
- The Ukrainian National Innovation Strategy 2030 aims to close legal gaps, strengthen entrepreneurship and improve the national innovation infrastructure.

Clear signs of progress are visible, but the IPO analysis noted several recurring shortcomings. Overall, innovation strategies reflect two systematic prejudices: the first towards a narrow definition of innovation as limited to research, frontier technologies and start-ups; the second towards the needs of existing economic activities and interests. There is an overwhelming focus on frontier technologies and high-tech industries and start-ups, neglecting the potential for innovation in most of the economy and in the public sector. The same goes for the consistent emphasis on product innovation, to the detriment of innovations in processes and marketing and experimentation with new business models. These shortcomings are important to address systematically, given the long-term problems with improving productivity noted in chapter I and the potential for improving corporate governance and firm productivity, as well as the large but underserved potential for innovation in agriculture, services and the public sector.

Despite a long-standing culture of research excellence and commitment to education, the research systems in EESC countries remain fragmented. As a result of the Soviet legacy, basic research is performed mainly by the academies of sciences, and applied research is done by research groups under line ministries, mostly separately from teaching in HEIs. Separation of teaching and research as well as the lack of academia-industry collaboration reduces productivity and undermines the research potential in the EESC countries. Recent reforms of academies of sciences and research systems have taken steps in the direction of improving the effectiveness and efficiency of national research systems, but they remain incomplete. In Georgia, recent reforms downgraded the Academy of Sciences to an association of scholars and a source of science policy. The research capabilities and availability of funding for the Academy are insufficient to enable it to be a driving force for scientific development in the country.

The scarce and gradually decreasing public funding for research goes mainly to public research institutions, while neglecting non-public R&D potential. Public funding is used mainly for basic research. Most of it goes to pay the salaries of research staff, with little left over for research projects, facilities and equipment. Applied and experimental research receive a fraction of public funds in the EESC sub-region, except in Belarus and Ukraine. Support mostly takes the form of institutional grants. Project funding is getting more traction, but it is not widespread yet. Available resources are not sufficient for maintaining

operations, leaving little opportunity to support R&D activities – and the capabilities, capacities and skills of public research organizations are not sufficient for them to use those resources efficiently.

Complementarities with other policy areas

In line with a broader tendency among EESC countries for line ministries to have few effective coordination mechanisms on specific topics, there are also few avenues for systematic coordination and for generation of synergies, not only within the remit of innovation strategies, but also among innovation strategies and a broad range of relevant policy areas. Nevertheless, innovation features as an important enabler and a cross-cutting theme in several strategies on education, SMEs and sustainable development. In the Republic of Moldova, the ICT Industry Competitiveness Road Map 2023 supports digital innovation in both the public and private sectors. By improving the supply of IT specialists, strengthening ICT infrastructure and creating favourable conditions for doing business, as outlined in the road map, the country seeks to accelerate digital transformation. Similarly, the national industrial strategy of Armenia seeks to promote leapfrogging to more advanced industrial stages through innovation. Broadly, few systematic mechanisms exist in the EESC countries for translating long-term strategies into short- and medium-term programming. Not all national strategies link clearly to sufficient funding commitments from the national budget, and many are downscaled and even abandoned for this reason.

Box IV.1

International best practices: research excellence initiatives

Sweden's innovation agency, Vinnova, launched the VINN Excellence Centres to improve the quality of research, contribute to socioeconomic development and foster closer collaboration between academia and industry. Participation in this research excellence initiative helps Swedish research groups to design long-term development strategies and create effective mechanisms for rolling out best practices in governance and research.

Research excellence initiatives like these reinvigorate national research systems by introducing international best practices in the governance of research institutions, robust assessments and evaluations, and improvements in the competitive environment of national research. Research excellence initiatives push research groups and organizations to develop long-term visions for self-sustained development and to collaborate more with international and domestic partners. Another positive effect is stronger links among research, teaching and business through joint graduate programmes and commercialization projects.

The EESC countries can consider launching research excellence initiatives as part of larger reforms of national research enterprises. Excellence centres can serve as driving forces for higher research productivity and greater alignment of research with the needs of socioeconomic development.

Source: OECD (2016), Hellström (2013).

Institutional frameworks

Institutions in charge of innovation policy in EESC countries are changing rapidly, with several reforms of existing bodies and the creation of new ones. Institutional changes occur against the backdrop of broader, overarching reform programmes. Some efforts are also under way to promote public sector innovation: In 2017, Ukraine introduced policy directorates across the Government to build capacities for and streamline the process of designing policies. At this writing, Ukraine is shifting the role of State departments from public service providers to “policy hubs”, to build capacities in designing and formulating policies.

In 2019, Azerbaijan set up a dedicated innovation agency to support research commercialization, knowledge transfer and business innovation, as well as a new Department of Innovative Development and E-government in the presidential administration, responsible both for the support of public and private sector innovation and for digital government. A clear division of roles and functions among the innovation policy actors in Azerbaijan is still emerging. Other EESC countries have established government units to introduce innovative approaches and share best practices in policymaking.

Setting up institutions is not enough: policy design, practice and results-based management have to be effective, flexible – and themselves innovative. Public innovation labs, for instance, may also collect and spread expertise and ideas. Two such EESC initiatives have received international recognition:¹ The Armenian SDG Innovation Lab aims to generate and test ideas based on behavioural science and data analysis, in support of SDGs across the public sector. The Azerbaijani Service and Assessment Network promotes innovation for improving public services and interventions through digital government.

Legal frameworks

Despite substantial progress over the past decades, the legal frameworks in EESC countries, as noted in chapter I, still contain gaps, overlaps and unintended incentives that impede the systematic experimentation with new ideas that will underpin sustainable development. The lack of clear legal definitions of start-ups, spin-offs and even innovation, for instance, hinders development of legal instruments for effective and targeted support initiatives. Special areas of concern are regulations on business insolvency, taxation and FDI, especially in terms of targeting positive, innovation-related spillovers and attracting venture capital. Although the EESC sub-region has made progress in aligning intellectual property rights (IPRs) with international standards, IPR protection is not fully and systematically enforced. Limited abilities in the judicial system to adjudicate IPR-related cases also result in lower IPR protection (OECD et al., 2020).

A significant barrier to achieving innovation policy objectives in the EESC countries are overlapping, inefficient and outdated laws and regulations, many of which protect incumbents and impede competition and innovation. Research and innovation are regulated so tightly that there is little room for business experimentation, and compliance alone is often burdensome. This makes it imperative that policymakers continuously reduce complexity, review and remove or mitigate legal barriers to experimentation (a vibrant innovation system includes substantial elements of what Munger (2018) terms “permissionless innovation”), and ensure market competition rather than protection of entrenched interests and rent-seeking.

International cooperation

Apart from Ukraine, the EESC countries are constrained by the limited size of their domestic markets, which impedes both innovation and the scale-up of things that work. Sustainable development requires further economic integration with the outside world, through trade, investment and networking. Most EESC enterprises fail to benefit from the potential of economic integration and global value chains. Many industrial standards and certification services remain incompatible with the norms of the EU and the Eurasian Economic Union (EAEU), and the organizational and managerial capacities of SMEs pose binding constraints on more systematic exploration of opportunities for them.

The EESC countries need to maximize the potential innovation spillovers from export diversification and from efficiency-seeking and strategic FDI in particular (see chapter I). Some have set up export promotion functions over the past decades (at times through dedicated agencies, such as AZPROMO in Azerbaijan, BELEXIA in Belarus and the Ukrainian Export Promotion Office). In addition to financial support, Enterprise Georgia offers SMEs training, grants for exhibitions and support for international certificates. In Azerbaijan, both the Small and Medium Business Development Agency and the new Innovation Agency support internationalization, and in Ukraine the Investment Promotion Office (UkraineInvest) also fosters business linkages with international partners.

Innovation policy coordination

Many EESC innovation agencies are still nascent, and cooperation between them and incumbent institutions is poorly structured. Although many policy domains include innovation as an instrument for solving specific challenges, overarching coordination of innovation policy in EESC countries is missing or patchy. That can lead to fragmented policy initiatives and consequently to lower effectiveness. Innovation support should be carried out through a mix of policies and from the perspective of the national innovation system.

Recognizing this issue, several EESC countries have set up high-level councils to coordinate innovation policy, with representation from relevant line ministries, academia and the business community. Commonly, however, these initiatives are ineffective, have unclear mandates, do not meet regularly or are not even operational. The State Committee for Science and Technology of the Republic of Belarus is operational, but its mandate is limited to research and technology – not innovation defined broadly. Neither the Georgian Research and Innovation Council nor the Ukrainian National Science and Technology Council is fully functional. Armenia, Azerbaijan and the Republic of Moldova do not have high-level institutionalized bodies to coordinate innovation policy.

Yet high-level councils can solve only part of the problem. Similar structures – with clear links to the overarching body – are necessary at the working level, such as to oversee interministerial work on specific thematic areas. Coordination working groups can make it possible for government authorities to communicate more frequently about issues that arise in coordinating innovation policy. At the same time, effective coordination requires a shift in the culture of the public sector towards a more open and collaborative network.

Box IV.2

International best practices: research and innovation councils in OECD member countries

Many OECD member countries have created research and innovation councils outside of line ministries to advise on the design of research and innovation policy, and in some cases to coordinate across government (Borowiecki and Paunov, 2018). The Finnish Research and Innovation Council, set up in 2016 and chaired by the Prime Minister, serves as an important platform for informing and monitoring different strands of innovation policy. It also involves non-government stakeholders. The Spanish Council for Scientific, Technological and Innovation Policy, founded in 2016, is the major coordinating body informing the Spanish Strategy of Science, Technology and Innovation and the State plans for research and innovation. It secures interministerial and interregional coordination, and systematically strengthens coordination efforts that generate synergies. Both show that strong, clear mandates as well as broad engagement and high-level support are important elements if such bodies are to operate efficiently.

Source: EC and OECD (2020).

Conclusion

The EESC countries need to create and continuously adapt the policies, institutions and rules that best enable and promote experimentation with new ideas. This effort should include comprehensive policies and strategies, transparent public institutions and governance, effective rules of the game, and continuous dialogue and policy coordination. It should encompass the business and regulatory climate, ranging from competition policies to property rights, and fundamentals, such as hard and soft infrastructure. It should cover innovation in the public sector as well as in all existing and potential private sector activities, including traditional industries, services and agriculture.

Pillar I IPO evaluation and recommendations

Achievements

- ✓ Innovation policy is at the centre of the political agenda.
- ✓ New national innovation strategies have been developed and new institutions in charge of innovation policy established during the last two years.
 - ✓ Reforms of legal frameworks are ongoing.

Area for improvement	Recommendation
<ul style="list-style-type: none"> • Government agencies have insufficient capabilities to support innovation policy. 	<ul style="list-style-type: none"> ✓ Improve the capabilities and skills of the public sector to design, formulate and implement innovation policy initiatives effectively. ✓ Give special attention to improving communication and cooperation between sectoral ministries.
<ul style="list-style-type: none"> • The efficiency and effectiveness of public funding of R&D are low. 	<ul style="list-style-type: none"> ✓ Improve the capabilities of government authorities in charge of innovation policy to manage human and financial resources more efficiently and systematically enable, pilot and encourage alignment and linkages with private sector demand as well as the commercialization of results.

Pillar I IPO evaluation and recommendations (Concluded)	
Area for improvement	Recommendation
<ul style="list-style-type: none"> Funding of R&D and strategic initiatives in innovation is low. 	<ul style="list-style-type: none"> ✓ Improve the governance quality, accountability and transparency of public institutions.
	<ul style="list-style-type: none"> ✓ Ensure sufficient public funding of research and innovation and move from suboptimal financing mechanisms to new arrangements for allocating funding.
	<ul style="list-style-type: none"> ✓ Explore alternative funding sources by leveraging private and international sources.
<ul style="list-style-type: none"> Legal and institutional frameworks are not sufficiently developed to support innovation policy. 	<ul style="list-style-type: none"> ✓ Improve the enforcement of laws and regulations without creating barriers for innovation activities.
	<ul style="list-style-type: none"> ✓ Enable permissionless innovation to spark greater experimentation and creativity.
	<ul style="list-style-type: none"> ✓ Address legal gaps in regulations on venture capital investment, insolvency, start-ups and spin-offs.
	<ul style="list-style-type: none"> ✓ Fully harmonize legal frameworks – in particular those related to IPR protection – with international standards and best practices.
	<ul style="list-style-type: none"> ✓ Remove regulations that protect entrenched interests.

Source: UNECE.

Note

¹ Arkun, A. (2019), National Sustainable Development Goals Innovation Lab pioneering for Armenia and the world, *The Armenian Mirror-Spectator*, 8 August, <https://mirrorspectator.com/2019/08/08/national-sustainable-goals-innovation-lab-pioneering-for-armenia-and-the-world>; Azerbaijan, Government (2020), “ASAN service” was awarded with the United Nations Prize, 12 October, <https://asan.gov.az/en/award/asan-xidmet-bmt-nin-muekafati-ile-telif-edildi>.

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Chapter V

INNOVATION POLICY TOOLS: SUB-REGIONAL TRENDS AND FINDINGS

The importance of effective innovation policy for EESC countries

Effective innovation policy supports the innovation eco-system along the entire innovation process. It requires policy tools to support businesses in absorbing existing knowledge and technology, particularly from abroad, something that is very important for small, open, middle-income economies like the six countries covered in this IPO. They are still relatively far from the global knowledge frontier and there are wide productivity differences across companies within sectors. These countries can therefore reap significant productivity gains by adopting and adapting existing state-of-the-art technology and business models.

Effective innovation policy also requires tools that promote domestic innovation, whether it is based on domestic R&D or on foreign knowledge. Moreover, it needs tools to develop and strengthen the linkages between key actors in the innovation ecosystems, particularly between business and science. Policy tools are also needed to support the diffusion of knowledge throughout the economy so that innovation processes can build effectively on existing knowledge and experience and can become cumulative. Finally, policy tools are needed to support domestic education and science as key sources of skills and new knowledge that are indispensable for sustained innovation.

Effective innovation policy should stimulate innovation across the economy, rather than in a subset of technology start-ups and R&D firms. Therefore, governments should complement tools to support product development and high-technology manufacturing across the sub-region with support measures for public sector innovation and improved management capacity. Furthermore, they should mobilize direct support to individual projects in the form of financial incentives and collaborative programmes, as well as demand-driven policies, to enable firms to commercialize innovative ideas and to provide an integrated and comprehensive response to present challenges. Frontier technologies, increasingly ubiquitous and affordable connectivity, the potential for digitizing and automating business and production processes, and the growing role of digital platforms in reducing transaction costs and creating a range of opportunities for entrepreneurship and sustainable development all present a range of opportunities for EESC economies and societies. Nonetheless, policies and institutions need to have the means and capacity to adapt rules and target support so citizens can benefit from them more systematically. Linkages are particularly important in a vibrant innovation system, helping firms scout demand, explore opportunities and transfer experiences. Networking platforms,

innovation infrastructure and targeted support mechanisms are essential elements (EBRD, 2019). As chapter 2 notes, transition economies need a broader definition of innovation if they are to unlock their scientific potential, while combining new activities with traditional sectors to upgrade domestic businesses and help them move up in global value chains (Kleibrink, Larédo and Philipp, 2017).

The pillar II assessment framework

Chapter IV presented sub-regional findings on innovation strategies, innovation policy governance and institutions. This chapter assesses the sub-regional evidence on innovation policy tools in terms of their quality, scale, scope, stage of implementation, impact and fit with the challenges to and opportunities for innovation in the respective countries and the sub-region. The first sub-pillar, *Knowledge absorption*, assesses the support for assimilating external knowledge and overall business development. The second sub-pillar, *Innovation promotion*, looks at the instruments that stimulate competition and provide incentives for investment in R&D activities. The third sub-pillar analyses *Relationships and linkages*, including innovation platforms that enable and encourage linkages between academia and business, as well as the infrastructure necessary to create an innovation system. The fourth sub-pillar assesses policy support for *Knowledge diffusion* within the economy, namely mechanisms that ensure equal and widespread access to information and demand-side policies, innovation brokerage schemes, standardization, and digitalization. The fifth sub-pillar, *Research and education*, evaluates policies to promote science, technology, engineering and mathematics (STEM) in higher-education institutions (HEIs), as well as fundamental and applied research, and cross-border cooperation on research.

Sub-regional findings

Reflecting the strong commitment of the EESC countries to innovation (chapter II), all have in place national innovation development programmes and related initiatives and measures, as part of overarching strategies for economic and sustainable development.

- The Digital Transformation Agenda 2030 of Armenia includes a series of short-term programmes for creating smart e-government, developing a digital labour force and enhancing cybersecurity, as well as investing on a large scale in expanding digital infrastructure.
- The Innovation Ecosystem Map of Azerbaijan outlines innovation development needs, policy support measures, currently implemented projects and proposed legislation for creating a national innovation ecosystem.
- The Belarusian State Programme on Innovation Development 2016–2020 includes 75 projects implemented to support the development of new industries with innovative potential in high-technology sectors.
- In Georgia an overarching project for innovative development is conducted with international support. The Georgia National Innovation Ecosystem (GENIE) project consists of broad-based investment in developing innovation infrastructure, digitalizing and supporting innovation activity in the private sector.

- The Republic of Moldova’s National Programme for Research and Innovation 2020–2023 outlines improvements to the national research and innovation system, including implementing projects for research collaboration and mobility, human capital development, smart specialization and international cooperation.
- The draft action plan of the Innovation Development Strategy 2030 of Ukraine outlines policy tools aimed at improving the innovation infrastructure, education in innovation and technology transfer, conditions for commercializing research and digitalization.

Sub-pillar I: Knowledge absorption

Absorbing external knowledge is essential for companies to innovate efficiently, particularly in transition economies, where significant productivity gains can be achieved when more companies adopt state-of-the-art organizational practices, business models and technologies. This requires specific managerial and organizational skills. The EBRD Business Environment and Enterprise Performance Survey (BEEPS) V (EBRD, 2020)¹ first identified the strong correlation between low levels of management quality and low labour productivity in the EESC sub-region in 2014 (see chapter II). Apanasovich et al. (2016) find significant positive correlation between organizational and technological innovation, providing evidence for the hypothesis that learning by doing could be the most efficient way to generate product innovation. These findings are confirmed by several other studies that conclude that good organizational and managerial practices heavily influence the adoption of external knowledge and have a large impact on innovative development within transition economies (OECD, 2017; EBRD, 2019).

Measures to develop organizational and managerial competencies are evident across the sub-region, including flourishing initiatives and new institutions. Almost all EESC countries have established government agencies dedicated to developing SMEs (Armenia, Azerbaijan, Georgia, the Republic of Moldova, Ukraine) (table V.1).

Table V.1 EESC government agencies for SME development

Country	Government agency	Year established	Jurisdiction
Armenia	Fund Investment Support Centre (ISC) ^a	2002	Ministry of Economy
Azerbaijan	Small and Medium Business Development Agency (SMBDA)	2017	Ministry of Economy
Georgia	Enterprise Georgia	2014	Ministry of Economy and Sustainable Development
Republic of Moldova	Organization for Small and Medium Enterprise Sector Development (ODIMM)	2007	Ministry of Economy and Infrastructure
Ukraine	SME Development Office (SMEDO)	2018	Ministry of Economic Development and Trade

Sources: UNECE.

^a Formerly known as the SME Development National Centre (SME DNC).

These institutions improve entrepreneurial skills and organizational effectiveness in SMEs through business management programmes, consulting and training. But the ability to experiment with and absorb new ideas is particularly limited in SOEs, which still dominate a significant portion of the sub-regional economy. Civil service councils and academies provide training and re-training of public sector personnel in several EESC countries (Belarus, the Republic of Moldova, Ukraine). Yet overall, more needs to be done to promote good organizational and managerial practices, because low managerial skills represent a major constraint on innovative development and productivity growth.

Technical and business services in the EESC sub-region are mainly supported through donor-funded initiatives, such as the EBRD Advice for Small Businesses programme. Although no national schemes or institutions are dedicated to these services, SME agencies provide some relevant consulting, marketing and financial services. Several state agencies across the EESC sub-region provide online registers of private providers (Armenia, Georgia, the Republic of Moldova); however, a broad and sustained market for technical and business services has yet to emerge, in part because of a lack of quality assurance mechanisms and in part because businesses are not sufficiently aware of service availability.

Recent years have also seen growth in innovation infrastructure, such as incubators, accelerators, clusters and business support centres. The degree of uptake varies considerably: the OECD SME Policy Index (2020) highlights that SMEs in all six countries have benefitted from support (co-)funded by government in this area, with the highest share in Georgia (48 per cent of SMEs) and the lowest in Belarus (5 per cent). Nevertheless, policy support for innovation infrastructure has not yet been able to give rise to a vibrant, sustainable market. In the absence of such results, broad policy support might consist of ineffective measures and may reflect rent-seeking and crowding out.

Across the EESC countries, fiscal incentives for innovation more broadly, rather than for sectors or SMEs, are scarce and mostly not clearly targeted. Many are limited to free and special economic zones, which focus on only certain industries, such as manufacturing (UNCTAD, 2019). With public or international funding (through partnerships or with donor support), all the EESC countries have established science and technology parks and industrial parks, where resident companies receive tax benefits. In recent years, tax exemptions for innovative companies have been implemented in Armenia and Belarus, and one is under way in Azerbaijan. One of the most important conduits for absorbing external knowledge is importing more advanced equipment and machinery. All countries in the sub-region provide indirect tax incentives for this purpose in the form of exemptions from value added tax and from customs duty on imported equipment and machinery.

Evaluating the effect of fiscal and tax policy on innovative development requires comprehensively assessing the tax framework to identify effective policies and potential areas for improvement in both specific sectors and the economy as a whole. This assessment is particularly important, as the direct and indirect costs of tax incentives can be high, and the effect of some on innovation is usually limited. Innovative companies struggle to break even in the early stages of the innovation process, so reductions in, say, corporate tax would have very little effect on the kind of investment decisions that innovation policy should target.

Sub-pillar II: Innovation promotion

Chapter I notes the substantial progress among the EESC countries in improving the regulatory environment for business. Beyond the business environment in general, governments can promote innovation by investing in platforms for young enterprises to develop and test innovative ideas. The number of business plan competitions across the sub-region has increased with the growing start-up movement. In addition to an array of start-up events, including project competitions, tours, summits, forums and master classes, national innovation competitions take place in Azerbaijan, Belarus and Ukraine, and cooperative grant competitions take place in Armenia, Georgia and the Republic of Moldova. International donors provide significant support through competitive grants and indirect financial support in the form of mentorship, training and networking opportunities. As of 2020, multiple innovation-based grant schemes are available in Armenia and Georgia, and several funds support innovation in Ukraine and Belarus; Azerbaijan is setting up an innovation grant scheme under its new Innovation Agency. Nonetheless, obtaining financing for further growth has proven difficult for companies in all six countries. It was identified as the principal strategic priority by the EU's EU4Business initiative in 2019 and as a pressing need by the EBRD Investment Summit that year (EU4Business, 2019). It is thus essential to explore the existing and potential synergies between grant schemes and to establish follow-up mechanisms and regular monitoring of competitive initiatives to measure the effect of allocated funds on the growth and productivity of beneficiaries.

Apart from grant schemes, only limited financing instruments provide support for investment in RDI in the sub-region. Credit guarantee mechanisms are used in Armenia and Georgia, and preferential entrepreneurship loans are distributed in Ukraine. In addition, since 2016, the InnovFin programme has been implemented by the European Investment Bank Group in cooperation with the European Investment Fund, further supporting innovation in the sub-region with a diverse set of financing tools. Nevertheless, R&D loans and valued added tax exemptions on innovative goods are largely unavailable, and the private sector investment scene is still emerging – business angels and venture capital investment are relatively new on the domestic markets of all six EESC countries. A publicly co-funded equity investment instrument has been introduced in Belarus, while in Armenia and in Azerbaijan international donors and private investors have supported the introduction of similar elements. Despite the need for seed capital, many entrepreneurs across the sub-region do not engage in fundraising because they lack experience with attracting investment and awareness of potential opportunities.

The innovation landscape in the sub-region has improved in recent years with the expansion of the support infrastructure for technology incubation. With the aim of responding to market needs, all six countries established publicly (co-)funded incubators to assist entrepreneurs in realizing their innovative ideas, often at the premises of HEIs. Incubator activity, however, has not had a tangible positive impact on innovative entrepreneurship. The need for qualified staff, monitoring and evaluation that is spotty and overly output-oriented, and gaps in service portfolios limit both the scope of incubators and the market demand for them. These recurring shortcomings constrain their effect on innovation, which includes a systemic failure to build on and commercialize results from applied research.

Sub-pillar III: Relationships and linkages

Governments can support innovation ecosystems by facilitating linkages among businesses, and between science and industry, as these linkages support scientists and businesspeople in commercializing research, creating new products and organizational processes. Business networks play an integral role in the economic development of transition economies, functioning as platforms for sharing knowledge, raising visibility and cooperation. Across the sub-region, business networking is supported mainly by chambers of commerce, business associations and unions, as well as private sector development projects. Several specialized SME agencies offer some form of matchmaking service to facilitate business and create strong intrasectoral linkages (Armenia, Azerbaijan, Georgia), and investment promotion offices work towards improving business conduct and the business environment in all six countries, linking foreign investors with domestic counterparts. The pool of contributing entities organizes events that include business training, business-to-business forums and international exhibitions. Although such platforms contribute to the development of business networking, their scope is often limited to ad hoc initiatives and conferencing events, proving insufficient to build strong cooperation among businesses. To develop more effective policies that respond more accurately to market needs, policymakers and industry stakeholders in the sub-region should engage in more systematic dialogue. Among efforts to create such dialogue are Armenia's sectoral councils and the Industry4Ukraine platform co-established by the Association of Industrial Automation of Ukraine and the Council of Entrepreneurs at the Cabinet of Ministers.

In all six countries, clusters are developing, boosting competitiveness, attracting foreign investment and growing exports in promising sectors of the economy. These sectors include ICT (Azerbaijan, Georgia, Belarus, Ukraine), creative industries (Armenia, Georgia, the Republic of Moldova), agriculture (Azerbaijan, the Republic of Moldova, Ukraine), engineering (Armenia, Belarus) and the automotive industry (the Republic of Moldova). Despite the market-driven growth of clusters, innovation policy in the sub-region often lacks a developed policy framework for clusters, mechanisms for collecting data on regional cluster initiatives.

Cluster stimulation and business networks in the sub-region are mainly supported by ad hoc projects funded by donors (the EU, the German Agency for International Cooperation, the United States Agency for International Development). Recent public-private partnerships between governments and private companies are generating significant impacts on innovative development; examples include Armenia's Engineering City (2018) and Azerbaijan's Digital Trade Hub (2019).

Developing an effective innovation ecosystem requires well-functioning and accessible support infrastructure. In addition to technology incubators, all six EESC countries have established diverse infrastructure elements – including science and technology parks, innovation spaces, accelerators and technology transfer centres – differing in scope, structure and activity. Good practices in the sub-region include government initiatives funded by international organizations, such as Georgia's Technopark (established in 2016) and Armenia's Gyumri Technology Centre (established in 2013). They also include government initiatives based on a public-private partnership model, such as Azerbaijan's Innoland Incubation and Acceleration Centre (established in 2016), as well as international partnerships, such as the Belarus-China Great Stone Industrial Park (established in 2012). These structures not only provide technology facilities and co-working space to

innovative firms, but also offer a wide range of services, training and project development programmes. High-technology parks concentrated in the IT sector have been established in Armenia (Vanadzor Technology Centre), Belarus (Hi-Tech Park) and the Republic of Moldova (IT Park). They offer generous fiscal regimes for resident companies. Engineering laboratories provide platforms for industrial prototyping and product development in Armenia (ANEL) and Georgia (FabLabs and iLabs). Despite the diversity of infrastructure supporting innovation in the sub-region, the IPO analysis identified several recurring shortcomings: publicly funded innovation support structures are often restricted to leasing premises and basic facilities, lacking value added services focused on the development of resident companies. At the same time, many infrastructure elements are not operational because of a lack of financing, a dearth of trained staff or insufficient innovative projects; regional centres often operate below full capacity.

Industry-science linkages in the sub-region are still in an initial stage of development, with fragmented policy instruments in place to stimulate cooperation, collaborative work and mobility between businesses and academia. Activity at public research institutions often occurs in isolation from market needs, and researchers do not actively participate in local labour markets. Industry-research networks in the sub-region are underdeveloped, supported mainly by ad hoc collaborative projects at universities (Azerbaijan). In addition, several government agencies supporting RDI in the sub-region are members of the European Enterprise Network, leveraging the expertise of international networks to support their domestic markets, including the National Agency for Research and Development of the Republic of Moldova, Georgia's Innovation and Technology Agency, and the Republican Centre for Technology Transfer in Belarus. To stimulate market-driven research activity, some state universities (Azerbaijan, Belarus, the Republic of Moldova) apply researcher evaluation mechanisms, but no country yet implements nationwide tools. Tools for greater mobility between academia and industry include dual general-vocational education, targeted work placement and enterprise traineeships for HEI personnel. With growing demand for business education, some countries (Armenia, Azerbaijan) have recently established joint industry-academia RDI centres as public-private partnerships.

The EESC countries apply few policy tools to incentivize collaborative work between businesses and public R&D institutions. The Republic of Moldova's State programme for innovation and technology transfer awards cooperative R&D-type grants for commercialization of innovative research on a competitive basis. Similar grants are available through Armenia's Science and Technology Entrepreneurship Programme funded by the World Bank and the Belarusian Innovation Fund. In Ukraine, the National Academy of Sciences organizes collaborative science and technology competitions, awarding grants to institutions conditional on external counterpart funding. Non-competitive support for collaborative work in the form of innovation vouchers was first introduced in the sub-region in 2014 through the EU Ener2i Research to Innovation project implemented in Armenia, Belarus, Georgia and the Republic of Moldova. It aimed to facilitate the development of innovative solutions for resource efficiency and the renewable energy sector. Despite the research evidence for the positive impact of such schemes on emerging innovation dynamics (Matulova, 2015; Spiesberger and Schoenbeck, 2019), innovation vouchers are offered only in Belarus (without successful candidates to date) and Ukraine (specific to climate technology). A policy framework for an innovation voucher scheme has been scheduled for implementation in Georgia in 2021.

Leveraging diaspora networks is integral to innovative development across the sub-region, with the potential benefits of cross-border knowledge absorption, investment in promising sectors of the economy and R&D spillover effects. Streamlining the temporary labour migration process and introducing functional regulatory mechanisms (Gevorkyan and Gevorkyan, 2012) are particularly important for countries with shrinking populations and large diasporas such as Armenia, but also Georgia, the Republic of Moldova and Ukraine. Most support from the diaspora has been successful without any specific engagement infrastructure. Nonetheless, a principal area of concern across the sub-region is the lack of national mobilization strategies to attract diaspora scientists and entrepreneurs living abroad (Gevorkyan, 2020). Functional regulatory mechanisms, such as a diaspora regulatory mechanism and a migration development bank, operating within a temporary labour migration regime managed by the State, could mitigate the unproductive misallocation of labour resources arising from such migratory trends (Gevorkyan and Gevorkyan, 2012). Multiple other support mechanisms exist: global networking events, foreign-based diaspora organizations, cultural centres and coordination councils (Armenia, Azerbaijan, Ukraine), diaspora databases (Armenia, Belarus), collaborative research projects and grant programmes (Georgia, the Republic of Moldova). Several countries in the sub-region have established government bodies dedicated to strengthening diaspora linkages, including Armenia (Office of the High Commissioner for Diaspora Affairs), Azerbaijan (State Committee on Affairs with Diaspora), Belarus (Consultative Council for Belarusians Abroad) and the Republic of Moldova (National Bureau for Diaspora).

Finally, it is imperative to streamline gender equality principles in the policymaking process in order to ensure a sustainable future for all. The growing representation of women in entrepreneurship, science and technology, as well as their high educational achievement, point to the critical role of gender equality in achieving innovation-driven growth and developing knowledge-based economies. Although legislation in all six countries establishes this principle, all face a long road before substantial differences in outcome are eradicated and the labour force participation of women converges with that of men. In addition to other recurring issues such as social expectations about gender roles, recruitment discrimination, the gender wage gap, and the accessibility and affordability of childcare (chapter I), the share of women in innovative entrepreneurship is low. To tackle these shortcomings, policy efforts have been made in all six countries with the support of governments, international donors and local non-profit organizations. Across the sub-region, initiatives for female entrepreneurship abound: for instance, Armenia established 10 Women Entrepreneurs' Clubs in 2018 with EU support, while in the Republic of Moldova a European training network (PLATO) for female entrepreneurs was launched in 2017.

Sub-pillar IV: Knowledge diffusion

The widespread access to and use of information requires sound support services aimed at planning and implementing innovation activities as well as improving both hard and soft skills in domestic firms. Although some informational support is available in all six EESC countries, instruments for technology upgrading are scarce across the sub-region, with a dearth of brokerage services and limited industrial technology assistance. Nevertheless, indirect support mechanisms contribute to the development of knowledge diffusion, including seminars, forums, international brokerage and business

matchmaking events (Azerbaijan, Belarus), provision of financial and technical tools as part of large-scale projects (Georgia, the Republic of Moldova) and scientific support offered at technology transfer centres (Belarus). To effectively diffuse knowledge across the sub-region, however, requires integrating relevant market intelligence services and technical assistance into all stages of the business development process.

Some policy efforts have been made towards developing national technology transfer systems through grant programmes (Georgia) and infrastructure development (Belarus, Ukraine). Nevertheless, across the sub-region technology transfer is relatively new and the available infrastructure used below potential. The identified shortcomings are also in line with the main findings of the forthcoming study of the European Commission's Joint Research Center on Technology Transfer (box V.1).

Companies in the sub-region frequently cite a lack of market demand for innovative products and services as a major reason why they do not invest more in R&D and do not engage more in innovation. Governments could use public procurement effectively as a tool to drive demand for innovation on national and sub-national levels (box V.2) while achieving policy goals for sustainable development (such as social objectives and green growth). Public procurement budgets in the sub-region frequently exceed 10 percent of GDP. Governments could use this ample potential to create a predictable and sustained demand for innovative solutions and thereby incentivize enterprises to find ways to meet this demand. Innovation-enhancing procurement requires moving away from tenders with technical specifications with revenues tied to stages to tenders in which bids and revenue flows are tied to impact, thus allowing bidders to experiment with different ideas. Policy efforts to introduce such instruments were made in Azerbaijan in 2019 with the development of a public procurement framework for innovative goods produced in the High Technologies Park of the Azerbaijan National Academy of Sciences. Ukraine has introduced green public procurement policies, in addition to a mechanism for procuring innovative solutions from projects that win the country's Inventions Support Fund grant competitions.

Box V.1

Technology transfer study of EU neighbourhood countries

The Competence Centre on Technology Transfer of the European Commission's Joint Research Centre has conducted a diagnostic and benchmark study of the state of technology transfer in the EU's eastern and southern neighbourhood including Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine, as well as Algeria, Egypt, Jordan, Lebanon, Morocco and Tunisia. The goal of this study was to assess the key issues and potential success factors underlying an effective knowledge and technology transfer system, with the ultimate objective of informing policymaking.

The preliminary findings of the study indicate that these systems have weaknesses that include low R&D budgets, young and under-resourced technology transfer infrastructure, insufficient financial instruments and incentives, intellectual property policies and legislation that do not adequately promote technology transfer, low academic entrepreneurship, and weak linkages between academia and industry. Publication of the final country reports and benchmark analysis is expected in late 2020.

There are natural synergies between the Joint Research Centre's study and the IPO. The two projects focus on analysing the quality of innovation ecosystems and identifying their strengths and weaknesses, with the aim of improving policies and informing future programming. Moreover, the EC and UNECE collaborate closely and share the objective and mission of supporting and strengthening the technology transfer and innovation ecosystems in the EESC sub-region.

Source: EC (2020).

Box V.2 Public procurement for innovation

Public procurement for innovation entails the acquisition of and investment in innovative processes and products or services by governments, ultimately fostering experimentation and increasing overall demand for innovation. Innovation-enhancing procurement, specifically, is driven by investment in R&D activities and spurs the development of novel, transformative and sustainable business opportunities and practices, especially for SMEs, and can enable transition economies to build back better after the COVID-19 pandemic.

There are several examples of good practices in public procurement of innovation outside the EESC sub-region.^a The Swedish innovation agency Vinnova, for example, has initiated the implementation of several national public procurement projects, such as the Innovative Traffic Systems in support of applications that provide traffic assistance to consumers. The country also participates in EU pre-commercial procurement initiatives such as INNOBUILD and PROBIS that support sustainable construction. In addition to being a member of INNOBUILD, Norway also participates in a Europe-wide public procurement project called AI4CITIES, which supports technological innovation in the use of artificial intelligence to reduce carbon emissions. Portugal is one of five European procurers participating in the project POSIDON, supporting effective and sustainable solutions for soil contamination, and Hungary, Poland, Spain and the United Kingdom have implemented the public procurement project CEPPI in support of innovative solutions for increased energy efficiency in cities.

Source: EC (2014).

^a EC (European Commission), Innovation procurement initiatives around Europe, 20 November 2014. <https://ec.europa.eu/digital-single-market/en/news/innovation-procurement-initiatives-around-europe>.

Standards and quality assurance certificates raise private sector competitiveness and help SMEs move up in global value chains. Across the sub-region, standardization policies lack instruments targeting SMEs, and laboratories often do not have the equipment necessary to perform testing procedures or specialists trained in product conformity assessment and standardization. Promotion of standardization comes from SME agencies, business associations and providers of technical and business services that help companies put standards into practice, but implementation of such services is insufficient, given the low awareness of ISO standards and the general reluctance of companies to incur associated costs. Nevertheless, procedures for issuing licences and permits have been significantly simplified in the sub-region over the past decade, and a series of EU twinning projects has assisted countries in harmonizing their quality assessment systems and competition laws with EU standards (Azerbaijan, Georgia, the Republic of Moldova, Ukraine). Furthermore, policymakers should consider that standardization could constrain innovation where stringent legal frameworks obstruct new technologies from accessing the market.

Across the sub-region, policy efforts have been made to digitalize, including developing unified open portals of e-government and improving broadband coverage. All six countries have adopted State programmes for developing a digital economy, with provisions for digitalized public services, expansion of digital infrastructure and development of a digital labour force. In addition to rapid broadband development, resulting improvements include a government cloud space (G-cloud) and e-commerce platforms (Azerbaijan), national grid infrastructure (Ukraine) and specialized infrastructure for the delivery of IT-related training (Armenia, Georgia). Yet despite achieving higher connectivity across the sub-region, business processes and products are not yet fully digitalized. Technical and vocational education in ICT is underdeveloped and unable to respond to the growing demand for trained specialists brought by rapid growth in the ICT sector. Further investment is needed to ensure ubiquitous, efficient and affordable connectivity across the sub-region.

Sub-pillar V: Research and education

As noted in chapter I, all EESC countries demonstrate strong political and societal commitments to education as a main pillar of sustainable development. A pressing challenge for education across the sub-region is bridging the gap between the output of national education systems and the needs of the labour market. Although policy support tools are abundant in the general education subsector, including national STEM competitions (Azerbaijan, the Republic of Moldova, Ukraine), scholarships (Georgia, Ukraine) and infrastructure development projects (Armenia, Belarus), incentives to increase the number of STEM graduates are limited and mainly covered by exchange programmes for undergraduate students. The low number of qualified STEM teachers, outflows of young researchers abroad, the concentration of STEM education in large cities and outdated curricula are some of the long-term constraints to solving the skill shortage discussed in chapter II. Broad-based reforms are taking place in the higher-education system of several countries, most prominently in Armenia, where pilot schemes have been launched in specific regions to evaluate policy impacts, and in Ukraine, where improvements have been made to modernize curricula, with a pronounced focus on STEM. Other recent developments across the sub-region include the introduction of STEM teacher training (Armenia, Azerbaijan, the Republic of Moldova) and vocational education (Azerbaijan, Belarus, Ukraine).

The EESC sub-region is renowned for its strong research legacy and scientific potential. Today, however, the pool of researchers is shrinking, public research funding is low (ranging from 0.2 to 0.6 per cent of GDP) and inefficient in terms of generating commercialization and spin-offs and enhancing productivity, and private sector investment in R&D is very low. The EESC countries have annually approved State research funding, except Belarus, which determines allocations by five-year programme cycles. The largest research institutions in almost all six countries are their national academies of sciences, receiving the highest share of State research funding. Thus, it is imperative for innovative development that activity at public research institutions is synchronized with the rest of the economy, responding to industry needs and systematically generating results that can be commercialized. Yet, in the EESC countries research is often performed in isolation, as noted in chapter II. Also, obtaining project finance can be difficult for public institutions, and the incentives for engagement with innovative projects at such institutions are scarce. Several countries offer competitive research funding for selected projects in priority areas. In Georgia, for example, the Shota Rustaveli National Science Foundation awards about \$25 million in research funding annually, with EU support. The National Agency for Research and Development of the Republic of Moldova helps commercialize research by distributing budget allocations for R&D on a competitive basis. Ukraine distributes competitive grant funding through individual, collective and institutional awards from the State budget, through the National Research Fund. When the private sector is concerned, however, the provisional support measures do not translate into increased investment in R&D, and academic researchers do not actively collaborate with the business sector. Among other shortcomings of R&D in the sub-region are the generally low accessibility of information about the research infrastructure and the limited availability of modern R&D equipment.

EESC countries are relatively well integrated into the international research community. All have engaged with international projects and joint research projects with foreign

counterparts that facilitate technology spillovers and enhance cross-border research cooperation. Early-stage research commercialization in the sub-region is also strongly supported by the EU Framework Programme for Research and Innovation, Horizon 2020. Researchers from all six countries are eligible for funding from the programme. EESC countries have thus deepened their integration into the European Research Area, with some countries having developed national road maps for integration that outline policy objectives for an effective national research system and optimal transnational cooperation (the Republic of Moldova, Ukraine).

Pillar II: Achievements and recommendations

EESC countries have developed a range of policy tools to support innovation, along with institutional frameworks and strategic documents to guide their implementation. To ensure positive impacts on innovative and overall economic development, support measures need to complement each other in a coordinated policy environment that supports and stimulates systematic experimentation with new ideas, co-creation and integrated diffusion of knowledge. Governments can use demand-driven policies to unlock innovation activity on the domestic markets, while ensuring high connectivity and accessible support infrastructure. They need to enhance and stimulate public sector innovations along with continuously promoting innovation activity in the private sector. Last but not least, aligning education outputs and research activity with market needs is integral for the optimal use of human capital and the development of a highly specialized workforce, able to commercialize innovative solutions in an enabling, knowledge-based economy.

Pillar II IPO evaluation and recommendations	
Achievements	
<ul style="list-style-type: none"> ✓ Policy and institutional frameworks to support the absorptive capacity of organizations have been developed across the EESC sub-region with specialized SME agencies, initiatives based on international expertise and preferential fiscal regimes in place. <ul style="list-style-type: none"> ✓ Innovation is promoted through business plan and start-up competitions, donor-funded projects and incubation services, stimulating entrepreneurship and contributing to the growing start-up movement across the sub-region. ✓ The innovation support infrastructure has expanded significantly across the sub-region, and initiatives have been introduced to support the creation of science-industry linkages. <ul style="list-style-type: none"> ✓ All EESC countries have policies that support information dissemination to enhance the diffusion of knowledge within their economies. ✓ An increased focus on STEM education and enhanced cross-border research cooperation contributes to the development of human capital and strengthens the integration of countries into the international research community. 	
Area for improvement	Recommendation
<ul style="list-style-type: none"> • Knowledge absorption is not sufficiently supported in technical and business service provision, and managerial skills development. 	<ul style="list-style-type: none"> ✓ Introduce co-financing mechanisms for technical and business services as well as quality assurance instruments for private providers of such services.
	<ul style="list-style-type: none"> ✓ Increase promotion of good public and private sector organizational and managerial practices.

Pillar II IPO evaluation and recommendations (Concluded)

Area for improvement	Recommendation
<ul style="list-style-type: none"> The policy tools for innovation promotion do not sufficiently address the issue of low access to finance. 	<ul style="list-style-type: none"> Introduce a set of direct financial instruments for innovative SMEs (concessional R&D loans and subsidies, credit guarantees) and indirect stimulation (exemptions from value added tax on innovative goods and services).
	<ul style="list-style-type: none"> Expand the scale of available venture capital financing to address the seed and early-stage development gap for innovative start-ups.
	<ul style="list-style-type: none"> Conduct a comprehensive assessment of the tax policy framework to identify potential benefits of introducing more targeted fiscal incentives for innovation.
<ul style="list-style-type: none"> Industry-science linkages and business networks in the sub-region are underdeveloped, and the innovation support infrastructure lacks value added services and regular monitoring. 	<ul style="list-style-type: none"> Expand the incentives for mobility and collaboration between academia and industry.
	<ul style="list-style-type: none"> Support and strengthen the linkages between higher education institutions and start-ups by further developing existing facilities for technology transfer.
	<ul style="list-style-type: none"> Construct a database of industry-science collaboration to identify priority support measures to address gaps.
	<ul style="list-style-type: none"> Develop a comprehensive framework for monitoring and evaluation of the innovation infrastructure, assess market needs and integrate value added services in the portfolio of relevant structures.
<ul style="list-style-type: none"> The ample potential of public procurement as a lever for innovative development has not yet been fully explored, and the existing policy tools for technology assistance are insufficient. 	<ul style="list-style-type: none"> Stimulate demand for innovative solutions by launching pilot and innovation-enhancing public procurement schemes in promising sectors, either separately or as part of existing support programmes.
	<ul style="list-style-type: none"> Extend the policy support in industrial technology assistance to stimulate technological modernization of production processes.
	<ul style="list-style-type: none"> Expand ongoing reforms of the higher education system to modernize university curricula and offer highly specialized qualifications that respond to labour market demand.
	<ul style="list-style-type: none"> Build a STEM community, engaging educators and individuals within and outside a formal educational setting to popularize STEM education and make technical careers more accessible.
	<ul style="list-style-type: none"> Expand incentives for commercializing research and R&D activity in the public sector.
	<ul style="list-style-type: none"> Conduct a comprehensive impact assessment of the research initiatives and grant programmes to identify potential inefficiencies and drivers of innovative development.
	<ul style="list-style-type: none"> Foster the development of state mechanisms for diasporas to prevent the misallocation of labour that arises from migratory trends.

Source: UNECE.

Note

¹ The BEEPS V dataset was last updated on 23 August 2017 (EBRD, 2020).

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Chapter VI

INNOVATION POLICY PROCESSES: SUB-REGIONAL TRENDS AND FINDINGS

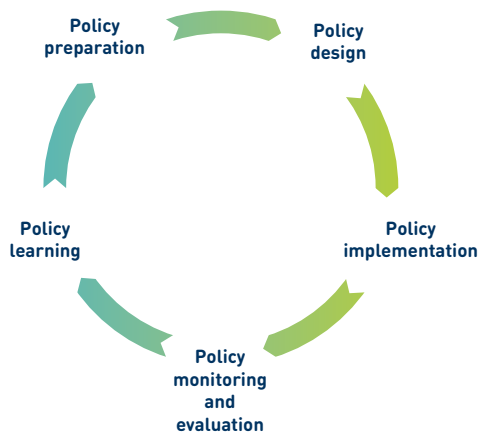
The importance of effective innovation policy processes

Policymaking processes determine the quality and effectiveness of laws, regulations and vertical support measures, which in turn, affect all areas of the economy, including science, technology and innovation (STI), and sustainable development. Getting policy processes right is especially important in times of crisis such as a global pandemic. To sustain innovation momentum in a world focused on urgent, short-term concerns such as keeping national economies from collapsing and ramping up social spending, governments must use resources carefully, especially as public spending grows rapidly.

This chapter explores the causes for the mismatches between innovation inputs and outputs in EESC countries. It examines the processes in place for making innovation policy, in particular how data and evidence are used in making decisions, designing

and implementing policy, and conducting post-implementation processes.¹ Therefore, the chapter also analyses how efficiently public administrations manage these policy processes, based on good governance practices not only related to innovation per se. Although policy processes can improve the quality of policies, they should be targeted and evaluated, to ensure they add value, not administrative burden.

**Figure VI.1 · Assessment framework of
pillar III – policy processes**



Source: UNECE.

Assessment framework

The assessment framework captures the quality of policy processes across the entire cycle from inception and preparation, through design, implementation and post-implementation (figure VI.1). Assessment of this last phase examines the extent to which policies are evaluated and learned from.

Unlike pillars I and II, pillar III is not scored and one specific policy is assessed in each country. Examining all innovation policy processes is beyond the scope of this assessment. Instead, important lessons are drawn for each country from one specific policy case. EESC countries were encouraged to select policies that were advanced in implementation and they tended to select policies that they considered successful.

Table VI.1 Policies selected under pillar III

Country	Policy
Armenia	Law on State Support for the Information Technology Sphere
Azerbaijan	Grant Scheme under the State Fund for Information Technology
Belarus	State Science and Technology Programmes
Georgia	Innovation Start-up Matching Grants Scheme
Republic of Moldova	Law on Small and Medium-Sized Enterprises
Ukraine	Strategy of Innovation Development 2030

Source: UNECE.

The analysis draws on primary data from innovation stakeholders, complemented by recent international sources, in particular the OECD, and SIGMA publications on the Principles of Public Administration.

Sub-pillar I: Policy preparation

The success of innovation policy measures is linked to the nature, incentives and quality of the preparation process. This process starts with an analysis to pinpoint problems, causes, challenges and opportunities. The team developing the policy must collect supporting evidence and provide it to decision-makers. The quality of the analysis is crucial in shaping the quality of the policy: the scope of the analysis determines what kinds of problems are identified and verified, thereby fundamentally affecting the objectives of the policy. Those tasked with drafting policy also need sufficient foresight to ensure that a policy tackles the most urgent and not only the most immediate issues. The immediacy of today's challenges often means that governments fail to take the time to engage with the future (Fuerth and Faber, 2012).

Preparation processes need to identify explicit performance metrics that guide continuous monitoring and adjustments. Innovation is an inherently uncertain effort, so a sound preparation process should provide the wherewithal to adapt policies, whether by modifying what is happening or stopping what is not working.

Innovation foresight is a nascent practice in the EESC sub-region, lacking rigour and systematic integration into policy analysis and decision-making. In Azerbaijan, for example, a rudimentary foresight analysis informed, for the first time, the Strategic Road Maps

for the National Economy and Main Economic Sectors, which included visions for the post-2025 period. In other EESC countries, innovation foresight occurs but tends to be ad hoc and restricted, tied to specific policy design efforts and not subject to continuous revision. Foresight plays a stronger role in Belarus, where the State Committee on Science and Technology has developed regular national forecasts of STI trends with the National Academy of Sciences since the late 1990s. Government institutions use these forecasts in conceptualizing policy. In 2019, they developed a comprehensive forecast of scientific and technological progress for 2021–2025 and until 2040. Priority areas of STI activities for 2021–2025 were approved by the President in May 2020 and the resulting State Science and Technology Programmes are closely linked to the outcomes of this foresight process.

Overall, the lack of systematic and continuous use of innovation foresight in EESC countries has three implications: First, innovation policies are rarely grounded in agreed, realistic assumptions from which key performance indicators (KPIs) follow. Second, it is rarely possible to monitor and evaluate impacts in a concerted fashion. Third, if the forecasts themselves are not continuously updated, then government risks getting stuck with measures that do not address actual needs or opportunities.

All EESC countries have set up legal frameworks that define requirements for line ministries related to preparing policy. Yet, the IPO analysis points to three recurrent issues with these frameworks:

- 1.** They are often not enforced centrally or systematically, and therefore at times are circumvented. For example, in the Republic of Moldova a widespread practice in line ministries is to submit draft policy proposals directly to members of Parliament for adoption, bypassing quality control and requirements for evidence-based policymaking.
- 2.** When they are followed, the implementation lacks depth and rigour. In Georgia, for example, under the rules of procedure of the Government and the Law on Normative Acts, institutions must provide general information about a proposed policy, explain the rationale and objective, identify the expected outcomes and assess the effects on the budget. Instead, the established practice has been to provide only explanatory notes of low quality, with scant details on rationale, impact and performance indicators. An exception is the comprehensive cost-benefit and market failure analysis that informed the Georgia National Innovation Ecosystem Project.
- 3.** The provisions of these frameworks are often unclear or contradictory. In Ukraine, for instance, two requirements aim to ensure the quality of policy design. First, the Cabinet of Minister's Rules of Procedures require for all policy proposals an impact assessment, a problem analysis, and a clear rationale and objectives. Second, the Law on the Principles of State Regulatory Policy obliges policy-drafting institutions to conduct regulatory impact assessments (RIAs) of all laws that affect the private sector. The two requirements do not align in their legal frameworks or their implementation. Policymaking institutions that work on private sector development therefore must prepare different RIAs and explanatory notes that largely overlap. This burdens these institutions without providing added value to decision-makers.

A positive development are the recent efforts in all EESC countries to develop structures for RIAs or to conduct pilot RIAs.² These efforts, many of them supported by donors, offer a potential platform for enhancing the quality of policy proposals

and moving towards more evidence-based policymaking – provided that they add value, not administrative burden, and become sustainable and country-driven in the medium term.

Sub-pillar II: Policy design

The policy design process should include stakeholder consultations, allow appropriate time and ensure coherence with other policies. Stakeholder consultations, with other government entities and non-governmental actors, ensure coherence and buy-in across government, relevance to the market and private sector needs, and the commitment of stakeholders to policy implementation. Ideally, gender balance should be considered during consultations and policy development. Governments should expect that stakeholders will advocate in their self-interest, which often is contrary to innovation, and therefore review stakeholder inputs carefully.

Stakeholders need enough time to engage effectively. Rushing the policy design process can easily result in suboptimal analysis, lack of clarity on objectives, incorrect or unclear actions and low credibility, buy-in and effectiveness, leading to dissatisfaction among internal and external stakeholders. Hence, to achieve a good-quality and credible policy, it is important to allocate enough time and institutional resources for its development and adoption (SIGMA and OECD, 2018a).

Innovation policy should align with and contribute to overarching socioeconomic development visions and strategies. To achieve synergies and avoid contradictory actions, policy priorities and activities should be coherent with other relevant policies.

Public-private consultations feature in the policy design process to some extent, albeit not always systematically and with sufficient depth. The analysis found that scrutiny of government work and participation in design by civil society, academia and the private sector is more open, influential, and systematic in Armenia, Georgia and the Republic of Moldova, compared with their regional peers. Ukraine lacks a basic law to uniformly guarantee citizens' rights in interactions with the public administration. In Belarus, the participation of the private sector, especially SMEs, is limited. In Azerbaijan, the level of information available to civil society about activities and decision-making is restricted until the policy has been developed and approved (Council of Europe, 2017). A recurrent issue across all EESC countries is the short time window (rarely longer than 10 days) allotted for stakeholders to comment on policy drafts and the lack of systematic efforts to ensure gender balance in consultations.

Interministerial consultations are structured through governmental rules for procedure. Yet, government bodies involved in such consultations usually face no regulatory requirement to issue formal opinions on draft proposals. In Georgia an e-government software program facilitates this process; it seems to work well and could be a good practice for peers in the sub-region. In practice, interministerial consultation works at least to some extent in most EESC countries: all specific policies examined under this pillar were coherent with overarching, interministerial policy strategies or road maps. In Azerbaijan, for instance, the grant scheme examined was coherent with the National Strategy for the Development of the Information Society. Support of start-up projects on ICT and high technology was included in the strategy in order to create an innovation system that fosters high-tech products and services.

Intraministerial consultations during policy design are not fully regulated yet. Usually departments within the same ministry share policy drafts only when deemed necessary. Thus, not all relevant departments within ministries are consistently consulted and involved in policy design. The lack of systematic intraministerial consultations is likely to cause missed opportunities for synergies and should be addressed.

There are few systematic training programmes on drafting policy for civil servants in the ministries responsible for STI policies. Trainings take place on an ad hoc basis within the remit of line ministries, with no cross-government quality assurance or certainty that the most relevant shortcomings in policy design are addressed.

Sub-pillar III: Policy implementation

To ensure that the policy is put into practice, governments need to put in place a range of processes. Recognizing the risk of unforeseen developments or effects, they need to establish processes to systematically evaluate the impact of policies during implementation using clear performance indicators – and modify them accordingly. The rapidly evolving technological environment requires the policy flexibility provided by a quick, yet considered and informed response to challenges and opportunities that arise.

Objectives, performance indicators and detailed action plans are the basis for regular review of progress. Continuous monitoring of and regular review of progress identify administrative, institutional and technical challenges and inform potential revisions and complementary measures, including adjusting activities and reallocating resources.

Implementation of the policies examined under this pillar is roughly in line with underlying objectives, performance indicators and action plans. Main outputs have been achieved and followed the output targets set. In Georgia, for example, the Start-Up Matching Grants Programme is on track, with one project financing cycle concluded in 2018, albeit slightly below the spending objective, and two more under way. As the programme becomes more known and its processes tested and established, the number and quality of applicants has increased – a trend Georgia's Innovation and Technology Agency expects will continue.

Appropriate costing and financing, political backing, and policy coherence are the leading reasons for the trend. Countries in the sub-region were asked to choose policies that were most advanced and that they considered most successful for the analysis in this pillar. The exception is Ukraine's Strategy of Innovation Development 2030, which at the time of the data collection did not have an approved action plan, despite having been adopted in July 2019.

Except for Ukraine's Innovation Strategy, all policies underwent some kind of review process during their implementation that led to subsequent adjustments. In all cases, these reviews were coherent with high-level, overarching policy developments, but rarely did data and evidence inform and drive these reviews and modifications. In Azerbaijan, for example, as a result of the shift from the "ICT Innovations" approach to the "Innovations Everywhere" approach in 2018, the Government established the Innovation Agency, to replace the State Fund for Development of Information Technology, with the aim of focussing innovation grant schemes on innovation in general rather than only in the ICT sector.

A shortcoming across all policies examined is the near-absence of a concerted sustainable development perspective. For example, the Innovation Strategy of Ukraine refers to laying the foundations for sustainable growth through innovation; however, it does not clarify the relation of interventions to specific social or environmental targets. All six EESC countries need to improve efforts and mechanisms to incorporate the three pillars of sustainable development in innovation policies, by focussing on the systemic impact and long-term effects of such policies on sustainability and by identifying overlaps or contradictions with other areas of public policy.

Sub-pillar IV: Post-implementation

One of the most important capacities that governments need is to learn from experiments and to stop or change what is not working. Evaluating policies and learning from them play key roles in informing how governments design, reform and put into practice future measures. Evaluations enhance accountability and establish legitimacy for the use of public funds and resources. They promote learning and enhance the efficiency and effectiveness of future policies. They should provide evidence for causality, value for money, social return and, importantly, potential trade-offs and negative effects that may have arisen unintentionally. The pressure to deliver more and better for less in the wake of COVID-19 makes this an area for urgent reform in the medium term.

Although policy evaluation practices have improved, these improvements are often driven by requirements by international donors for individual projects, rather than for innovation policies overall. Georgia is a partial exception: the Policy Planning, Monitoring and Evaluation Manual, developed in cooperation with OECD-SIGMA, set new, uniform, good practice-based standards for evaluating policies and assessing impact.

Looking more closely into the evaluation processes, several problematic issues become clear – especially regarding the imperative to learn from what is not working. The evaluations were carried out by the implementing bodies, with clear conflicts of interest, were superficial, and were centred on outputs (such as the number of grants disbursed), with no analysis of outcomes and impact and trade-offs. There are few processes in place to ensure that learning systematically informs the policy design process. EESC governments need to make concerted efforts to establish a culture of evaluating policies, by promoting the quality of policies, through guidelines, capacity-building and ex-post review and control mechanisms. Whenever evaluation does take place, it needs to be leveraged, with lessons learned and problems identified informing future policies.

Pillar III: Achievements and recommendations

Pillar III IPO evaluation and recommendations	
Achievements	
<ul style="list-style-type: none"> ✓ Legal frameworks for policy preparation are largely in place. ✓ Public-private consultations occur in all EESC countries during innovation policy design, albeit at varying degrees of openness. ✓ Governments structure Interministerial consultations through rules for procedure. <ul style="list-style-type: none"> ✓ Implementation or enforcement of most policies examined is on track and follows an action plan. 	
Area for improvement	Recommendation
<ul style="list-style-type: none"> • Innovation policies do not sufficiently consider the three pillars of sustainable development. 	<ul style="list-style-type: none"> ✓ Enhance efforts and mechanisms to incorporate the three pillars of sustainable development in innovation policies. ✓ Integrate innovation foresight practices into the policy processes of relevant ministries to capture future trends in and perspectives on research activities for incorporation in the long-term strategic direction of innovation development.
<ul style="list-style-type: none"> • The underlying analysis that shapes policy preparation is limited and not sufficiently based on evidence. 	<ul style="list-style-type: none"> ✓ Review the legal frameworks for preparing policy to ensure that they are clear, flexible, appropriate for the purpose and complied with – and enforce them. ✓ Build on RIA efforts to enhance the quality of policy preparation and its evidence base, ensuring that efforts add value, not administrative burden, and become sustainable.
<ul style="list-style-type: none"> • Scrutiny of government work and participation in innovation policy design by multiple stakeholders is not systematically ensured. 	<ul style="list-style-type: none"> ✓ Develop and/or enhance ministerial approaches to public-private consultation on policy design and implementation. Consider gender balance during consultations and in developing policies. ✓ Strengthen interministerial consultation processes, ensuring that all relevant government bodies are involved in the policy design process and given enough time to comment. ✓ Define realistic implementation timelines and targets. Regularly review policies against these timelines and targets, and update them in light of both unforeseen developments and progress towards clear KPIs.
<ul style="list-style-type: none"> • Policy evaluation and impact assessments are of poor quality or not implemented at all. 	<ul style="list-style-type: none"> ✓ Establish a culture of evaluating policies and promote the quality of policies, for instance through guidelines, capacity-building and ex-post review and control mechanisms. ✓ Adopt a more systemic linkage of monitoring and evaluation practices to policy design, including in government bodies responsible for STI policy.

Source: UNECE.

Notes

- ¹ In this chapter, policies are defined as all systems of laws, strategies, regulatory measures and vertical support measures affecting STI that a governmental entity or its representatives promulgates; post-implementation is defined as policy evaluation and policy learning.
- ² According to the OECD (<https://www.oecd.org/regreform/regulatory-policy/ria.htm>), “Regulatory Impact Analysis (RIA) [sic] is a systemic approach to critically assessing the positive and negative effects of proposed and existing regulations and non-regulatory alternatives. As employed in OECD countries it encompasses a range of methods. It is an important element of an evidence-based approach to policy making. OECD analysis shows that conducting RIA within an appropriate systematic framework can underpin the capacity of governments to ensure that regulations are efficient and effective in a changing and complex world. Some form of RIA has now been adopted by nearly all OECD members”.

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Part II

COUNTRY-
BY-COUNTRY
ANALYSIS



ARMENIA



Chapter I

ECONOMIC OVERVIEW

General overview

Armenia is a small, landlocked, upper-middle-income country in the South Caucasus, neighbouring Azerbaijan, Georgia, the Islamic Republic of Iran and Turkey. Its transition to a market economy, challenging in its own right, has been compounded by political instability and closure of borders with Azerbaijan and Turkey. The deceleration of economic growth in 2014 – caused by declines in remittances and in the volume and prices of copper exports, and the Russian commodity crisis (IMF, 2018), as well as overreliance on remittances and rickety public finances – make its economy vulnerable, especially with investment contracting and productivity stuck at low levels. High levels of outmigration spur the expansion the Armenian diaspora, while its potential remains underused. Far-reaching, though far from complete, reforms have ensured sustained but volatile growth in gross domestic product (GDP), following a radical slump after independence and the global financial crisis. These reforms also have ensured renewed dynamism in sectors such as tourism and information and communication technology (ICT) services. Nevertheless, innovation will be essential for finding sustainable growth paths that expand and make the most of a legion of opportunities, in particular for further economic integration with the European Union (EU) and the former Soviet Union.

Reform process

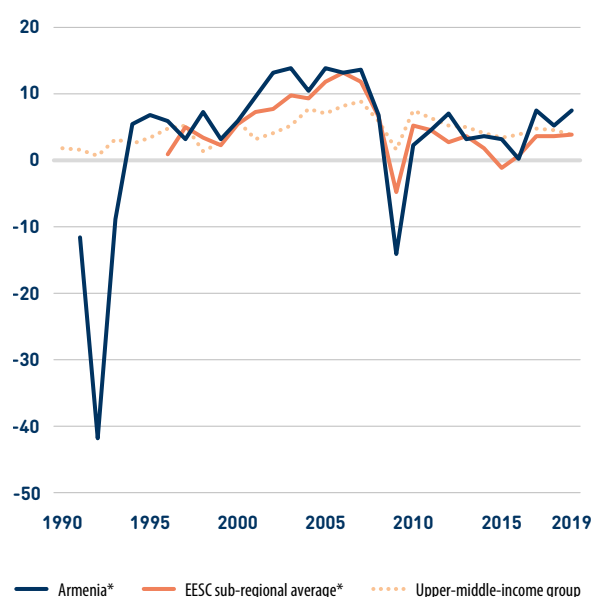
Since Armenia attained independence in 1990, the economy has changed fundamentally – although more recently, the pace of reform has slowed. Several market-oriented reforms took place, including financial liberalization, large- and small-scale privatization, and reform efforts towards increased trade and investment. Improvements in tax and customs administration in 2011–2014 helped rein in corruption, and current reforms focus on attracting foreign direct investment (FDI) and improving the business climate, primarily by reducing regulatory obstacles to private sector development. In 2018, anti-government protests driven by the high levels of corruption in the ruling government led to a peaceful change in power known as the Velvet Revolution, providing new momentum for further institutional reforms. Indeed, Armenia ranked 47th of 190 economies in the 2020 *Doing Business* report, an improvement from 2010, when it ranked 61st. Nonetheless, weaknesses in domestic market competitiveness and corporate governance limit growth prospects for Armenian firms, with ample scope for rent-seeking and incentives that steer investment towards established, low-capital-intensive activities rather than diversification and innovation (World Bank, 2017).

GDP growth

Following an initial sharp decline after independence, Armenia saw significant growth in the 2000s – 11 per cent on average – fuelled by external investment flows and significant job creation in booming sectors, such as construction (figure I.1). After the economic decline caused by the global financial crisis, the main drivers of Armenia’s economic recovery were the mining industry, specifically the expanding production of copper, and the growing IT industry in the services sector. After a slight decline in 2015, GDP per capita in current US dollars increased from \$3,592 in 2016 to \$4,623 in 2019. Robust growth has been sustained at 7.6 per cent, driven by expansions in services, industry and trade, although growth is expected to decline to below 2 per cent in light of the pandemic (World Bank, 2020d). GDP per capita based on purchasing power parity doubled from 2009 (\$7,233) to 2019 (\$14,220) (in current international US dollars), putting Armenia ahead of the Republic of Moldova (\$13,574) and Ukraine (\$13,341) (World Bank, 2020b).

Following the 2008–2009 global financial crisis, the country’s rate of growth became increasingly exhausted. Structural weaknesses in the Armenian economy and the country’s vulnerability to external shocks, in addition to high unemployment rates, inhibited further economic growth (IMF, 2019). The decline in growth rate was compounded by the crises in Russian commodity prices and subsequently in Russian currency in 2014–2015, leading to rapid declines in both remittances and FDI. Personal remittances fell from 19.7 per cent of GDP in 2013 to 11.2 per cent in 2019 in the wake of the crisis and devaluation, while remaining a significant share of income. The country’s high dependence on remittances is largely due to the size of the Armenian diaspora – between 6 and 8 million people in 2017, comprising well-established and organized communities worldwide (box I.1). Gross capital formation has declined more recently, from 22 per cent of GDP in 2018 to 17 per cent in 2019.

Figure I.1 • Annual GDP growth, 1990–2019 (Per cent)



Source: UNECE, based on data from the World Bank (2020b).
*Missing values for the Republic of Moldova (1990–1995), and Armenia, Belarus and Azerbaijan (1990).

Box I.1 The Armenian diaspora

Of 11 million Armenians, only 3 million live in Armenia, making the diaspora one of the largest in the world. This diaspora is essential to the country as a source of not only personal remittances but also FDI, ideas and contacts. Although engaging with the diaspora has triggered some innovation, such as in ICT services, its potential is underexploited, giving ample room for effective public support as part of an overall effort to promote innovation and experimentation for sustainable development.

Source: World Bank (2017).

The Government responded through entitlement spending and infrastructure investment, but this will be unsustainable in the long run, as public debt grew to \$6.2 billion in 2017 (almost a twofold increase since 2010), at 53.7 per cent of GDP (EC, 2019). Domestic consumption drove growth, especially through demand for construction in the 2000s, but stagnated over the past decade. Government expenditure in 2018 amounted to about 23 per cent of the country's GDP, while the account deficit reached 8.2 per cent of GDP in 2019, a decrease from 2018 (9.4 per cent) but not reaching the value of 2016 (2.1 per cent).

Foreign direct investment

FDI flows, predominantly from the Russian Federation, Germany and Greece, have gradually declined as a share of GDP since the global financial crisis, falling to 1.9 per cent in 2019 (from 3.2 per cent in 2016), the lowest in the Eastern Europe and the South Caucasus (EESC) sub-region (World Bank, 2020b). Among the main contributors, after the mining and energy industries (Bogov, Kresic and Beschastna, 2019), are the largest Armenian diaspora communities – those in the Russian Federation, the United States and the Islamic Republic of Iran. Armenia's moderate wage levels, skilled labour force and natural resources should make it an attractive target. So far, however, most investment has been market- and resource-seeking, flowing into transport, telecommunication, ICT, energy, metallurgy, tourism and mining.

Sectoral decomposition

The production structure in Armenia reveals a reliance on low-productivity activities with limited diversification. After the structural destruction that took place in the 1990s – accompanied by rising inequality, high unemployment and poverty – macroeconomic stabilization focused on export-led growth, most visibly in the export of commodities such as metals, tobacco and liquor (Gevorkyan, 2015). The share of agriculture in GDP has declined over the past decades, to 12 per cent in 2019, yet remains the highest among the EESC countries (UNECE, 2014; World Bank, 2020b). Although employment in the sector is decreasing, reaching 30 per cent in 2019 (World Bank, 2020b), weak and outdated infrastructure makes productivity in agriculture the lowest among all sectors (Bogov, Kresic and Beschastna, 2019). The value added of industry remained stable at about 25 per cent between 2014 and 2017, with a slight decrease to 24 per cent in 2019, and industry employed 17.2 per cent of the labour force (World Bank, 2020b). The value added of manufacturing has increased by two percentage points since 2015, to 11.7 per cent in 2019 (World Bank, 2020b). Yet agriculture, mining and manufacturing activities are driven mainly by the production of low value added commodities (Bogov, Kresic and Beschastna, 2019). In contrast, the services sector now makes up more than half of the economy (54 per cent of GDP), especially in trade, tourism, financial services and the growing, export-oriented ICT sector (chapter II) (EIF, 2018). It employed 53.2 per cent of the labour force in 2019.

Demographics

Population growth has fallen from 0.5 per cent in 2013 to –0.25 in 2018 (Armstat, 2020) – the second highest rate among EESC countries after Azerbaijan (0.87 per cent) (World Bank, 2020b). This points to low fertility rates, at the same time as outmigration was increasing (World Bank, 2020b). Formal unemployment rose sharply starting in 2007 – from 9.8 per cent to 18.4 per cent in 2009 – and has stagnated since, at 17 per cent in 2019. This level of sustained unemployment is the highest among EESC countries, indicative of the continued systemic inability of the economy to innovate, restructure, create job opportunities and build the right skills (Honorati et al., 2019). Given the strong indications of skills mismatches in the labour market – a result of both inadequate policy responses to reforming education and significant outmigration – innovation, sustainable growth and employment overall likely will continue to be constrained.

External position

Since joining the World Trade Organization (WTO) in 2003, Armenia has gradually opened up to trade but remains constrained by high transport costs arising from its geographical position and partially closed borders, with most goods trade passing through Georgia. Armenia joined the Eurasian Economic Union (EAEU) in 2015, with access to the Russian, Belarusian, Kazakh and Kyrgyz markets. It concluded a range of bilateral and multilateral trade agreements, including with Georgia and Japan, as well as with the United States and the EU under the Comprehensive and Enhanced Partnership Agreement, since June 2018 (EC, 2020). For a small country, the sum of exports and imports of goods and services is high, at 91.3 per cent of GDP in 2018 (World Bank, 2020c), with exports of goods and services accounting for 38.5 per cent of GDP.

The low level of export diversification and the reliance on low value added manufacturing exports remain impediments to further economic growth. According to the index of merchandise concentration for exports, where values range between zero (diversified) and one (concentrated), exports from Armenia (0.27), are one of the most concentrated in the EESC sub-region (0.27), compared with those from the Republic of Moldova (0.19) and Belarus (0.18). They are more diversified than only Azerbaijan (0.83) (UNCTADstat, 2020b). The main commodities exported in 2018 were copper ore (24.3 per cent), gold (12.1 per cent), ferroalloys (6.9 per cent), rolled tobacco (9.3 per cent) and hard liquor (6.8 per cent), amounting to more than half of exports of goods; the remaining share was distributed across various groups, (HS4) such as textiles, vegetable products and machines (OECD, 2020). These commodities represented among the strongest revealed comparative advantages (RCAs) of Armenia, with products (in the three-digit group) such as tobacco, alcoholic beverages, copper ores and pig iron with RCAs over 10 (UNCTADstat, 2020c).

According to the 2019 Competitive Industrial Performance (CIP) Index, which measures industrial capacity and impact on the global market, Armenia ranked 103/150, lower than Georgia (96), Belarus (47) and Ukraine (69) (UNIDO, 2019). Furthermore, the Global

Competitiveness Index (GCI) ranked Armenia 70/140 in 2018, an improvement from the previous year (72); the country's competitive strengths lie in the labour market (33), the product market (39), skills (55) and ICT adoption (56) (WEF, 2019).

Institutional quality

In 2018, with a score of -0.2 , Armenia's institutional quality – assessed as an average of the 2018 World Governance Indicators (Kaufmann and Kraay, 2020) – was the second highest in the region after Georgia (0.5) and slightly above the regional average (-0.3). As higher governance scores indicate better institutional quality, the negative values suggest that there is still room for improvement, given that corruption (-0.35 in 2018), rule of law (-0.15) and inefficient government bureaucracy (-0.02) remain among the main obstacles to business innovation, after access to finance.

Sustainable development

Growing income disparities risk undermining long-term sustainable development in Armenia. The country's Gini index rose from 28 in 2009 to 34.4 in 2018 (World Bank, 2020b), as remittances fell and fewer jobs were available for low-skilled workers following the decline in the construction sector. Despite substantial progress, in 2018 about 23.5 per cent of the population still lived below the national poverty line (World Bank, 2020). In 2019, the rate of participation in the labour force of women (modelled International Labour Organization (ILO) estimate) was about 47 per cent, substantially lower than that of men (74 per cent). Yet in 2018, approximately 63 per cent (gross) of women were enrolled in tertiary education, which is not only a sizable increase from the 19 per cent recorded in 2000 but also higher than the 47 per cent of men enrolled in 2018.

The country scored second highest in the EESC region (80/129) in terms of GDP per unit of energy use in the 2019 GII. Overall carbon dioxide emissions rose consistently between 2015 and 2018 (Armstat, 2020), and the mining sector remains one of the main sources of both chemical waste and pollution (Armenia, 2018). Although Armenia relies on imports of oil and natural gas for the majority of its energy consumption, it produces a significant amount of energy from domestic nuclear and hydroelectric power plants. The country has adopted policies to promote renewable energy production, increasing the number of small hydropower plants with the aim of fostering sustainability (World Bank, 2017). In addition, good progress has been made in environmental protection in terms of enlarging protected areas and biodiversity.

Synthesis

This table presents the main achievements of and challenges for the economic development of Armenia, based on the findings described in this chapter.

Progress made so far

- Increased international trade from accessing new markets and maintaining liberal trade policy
- Market-oriented reforms that improved the business climate and institutional quality
- Expanded services and manufacturing, rapidly developing the tourism, agribusiness and ICT sectors
- Good progress in environmental protection and energy efficiency

Challenges ahead

- Further diversify exports to take advantage of trade opportunities in products and services.
- Maintain the strong reform momentum and increase market competitiveness, stimulating productivity in agriculture and other sectors (such as through innovation).
- Ensure efficient institutional governance and quality in public administration to remove or mitigate the effects of constraints on experimentation and tackle corruption.
- Diversify domestic and foreign investment, in particular into efficiency-seeking, export-oriented activities, through targeted innovation and FDI policies and greater engagement with the diaspora.
- Achieve a higher level of economic development by raising employment and reducing poverty across the country.
- Address structural inefficiencies to mitigate the skills mismatch between the labour force and the labour market.

Source: UNECE.

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Website

Armenian Energy Agency: <https://energyagency.am/en>

Chapter II

INNOVATION PERFORMANCE OVERVIEW

Innovation climate

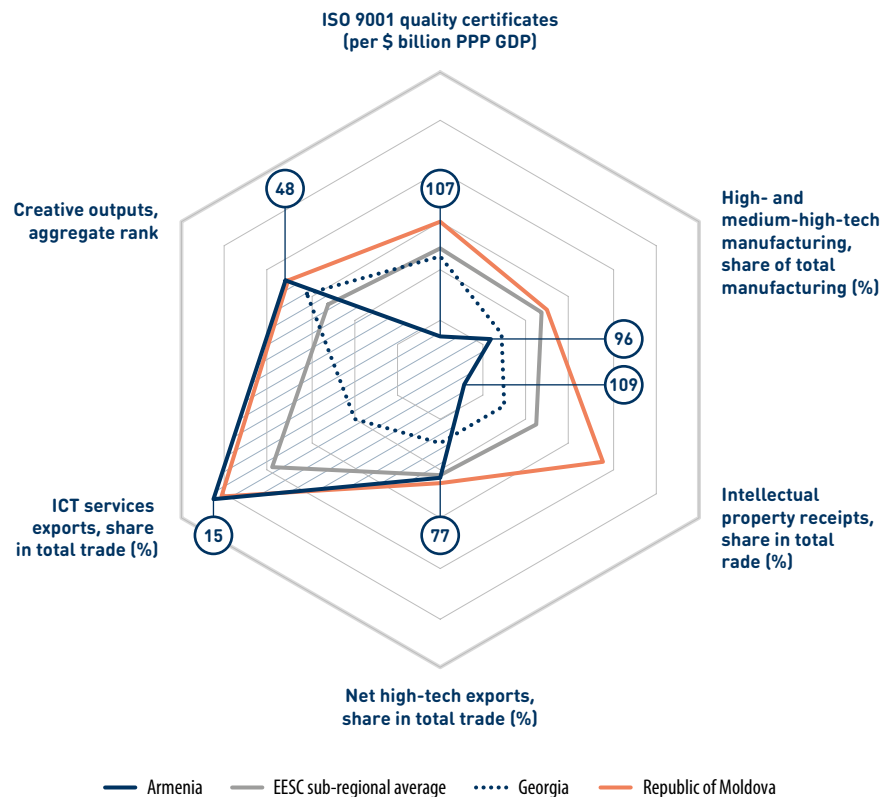
Armenia's strong economic growth in recent years, driven by a significant expansion of the services sector and the improved business climate, has made a positive impact on the country's innovation performance. The ICT sector is growing. The economy efficiently translates innovation inputs into outputs, with several niches of excellence, such as ICT services exports and creative outputs. Further progress towards a more knowledge-based economy is impeded by significant gaps that remain in the national innovation system, including weak investment in research and development (R&D), low levels of competitiveness and business innovation, the low quality of education, the low level of innovation absorption capacity and the skills mismatch in the labour market.

Innovation outcomes

In 2019 Armenia was classified as an innovation achiever in the Global Innovation Index (GII), ranking 64th out of 129 economies, slightly below the sub-regional average (62nd). In terms of innovation outputs, the economy's performance on the global scale varies from leading its peers (in ICT service exports and creative outputs) to lagging behind them (in quality certificates from the International Standards Organization (ISO) and intellectual property receipts). Figure II.1 on the following page depicts the country's innovation performance on selected output indicators, as ranked globally in the 2019 GI.

In terms of innovation outputs, the country performed well on ICT services exports (ranking 15/129) and on creative outputs (48/129), scoring above the sub-regional average. It showed particularly strong performance in trademarks (18/129) and industrial designs by origin (52/129). In contrast, for the share of high- and medium-high-tech goods in total manufacturing output, Armenia ranked the lowest (96) of the EESC countries, well below the sub-regional average (73). The share of high-tech exports in manufactured exports was 1.1 per cent in 2007 but rose to 9.9 per cent in 2019 (World Bank, 2020a). This ranked Armenia 77th in the 2019 GI for high-tech net exports (0.6 per cent of total trade), outperforming Azerbaijan (0.1 per cent) and Georgia (0.3 per cent), but still lower than the Republic of Moldova (0.7 per cent) and Belarus (1.8 per cent). Armenia has not yet been able to generate significant revenues from selling or licensing intellectual property abroad. Perhaps more worryingly, domestic companies overall have not made significant progress in attaining international quality standards, as measured by the number of

Figure II.1 • Innovation performance by selected GII indicators – 2019 ranks



Source: UNECE, based on data from Cornell University, INSEAD and WIPO, 2019.
Note: Lower value signifies stronger performance.

ISO 9001 quality certificates relative to GDP. Meeting international quality standards in production is one of the major steps in upgrading technology and a prerequisite for integrating into international value chains and penetrating foreign markets.

The lack of recent national and sectoral data on private sector innovation activity compounds the gaps in the policy support system. In the latest Business Environment and Enterprise Performance Survey (BEEPS V) of the European Bank for Reconstruction and Development (EBRD, 2017), Armenian firms identified low access to finance as the main obstacle.

The rapid growth of the ICT sector has driven the expansion in service exports. Because of the country's improved business regulatory performance, the ICT sector provides substantial opportunities for further growth (Amirkhanyan, 2017; World Bank, 2020d). ICT services exports have risen to 11 per cent of all exports in 2017, considerably higher than in Azerbaijan (1.4 per cent) and Georgia (2.3 per cent), but still lower than in the Republic of Moldova (14 per cent). ICT goods exports, which constituted 1.26 per cent of total export goods in 2012 but decreased to 0.16 per cent in 2013, have been relatively stable in recent years, amounting to 0.19 per cent in 2017. This was higher than in Azerbaijan (0.02 per cent) but lower than in the Republic of Moldova (0.28 per cent)

and Georgia (0.56 per cent). The ICT infrastructure has also improved in recent years, with fixed broadband subscriptions increasing steadily within the last decade, from 0.47 per 100 people in 2008 to approximately 11.8 per 100 in 2018. Nonetheless, subscription levels are still lower than those in the Republic of Moldova (15 per 100), Azerbaijan (19) and Georgia (21). In the 2019 GII, although Armenia scored above average in terms of ICT access (36th), it ranked 67th globally on ICT and organizational model creation, 70th in ICT use and 88th in ICT and business model creation, highlighting the weak performance in process innovation in the economy.

Innovation activity – channels, strengths and weaknesses

Innovation outcomes are a reflection of the innovation activities that firms undertake. Firms can innovate by absorbing and adapting knowledge and technology from abroad, by generating innovation in-house through R&D and by collaborating with scientific organizations to commercialize academic research. These three channels are not mutually exclusive. On the contrary, they are typically complementary. To be successful in any and all three of these channels, firms need innovation-specific skills both in their management and in their work force. The remainder of this chapter discusses Armenia's strengths and weaknesses along these dimensions.

International knowledge transfer

For small, open, middle-income economies like Armenia, absorbing and adapting existing knowledge from abroad offers significant scope for raising productivity, competitiveness and economic growth at relatively low cost and risk (Goldberg et al., 2008). The three main conduits of foreign knowledge inflows are imports of machinery and equipment, FDI and the licensing of foreign intellectual property. Foreign knowledge absorption in Armenia remains low, ranked 114/129 on the 2019 GII (Cornell University, INSEAD and WIPO, 2019). Armenia ranks below the top 100 economies in ICT services imports, high-technology imports and intellectual property payments. In 2013, ICT goods imports were 3 per cent of all goods imported; in 2017 they rose to 4.13 per cent, higher than in both Azerbaijan (3.7 per cent) and the Republic of Moldova (3.9 per cent) and lower than in Georgia (5.7 per cent) (World Bank, 2020a). High-tech imports constituted 4.8 per cent of total trade, exceeding the share in only Azerbaijan (2.8 per cent) in the rest of the sub-region. Moreover, only 1.7 per cent of gross expenditure on R&D is financed from sources abroad.

FDI inflows accounted for 1.9 per cent of GDP in 2019, the lowest among the EESC countries. Nevertheless, with foreign enterprises having a 35 per cent share of the domestic market, the growing ICT sector gives rise to significant opportunities for knowledge absorption and expansion in service exports, while supporting a national start-up movement in ICT. The 2019 Global Competitiveness Index (GCI) ranked the country above the average for the upper-middle-income group on ICT adoption. Nonetheless, both further investment in R&D and development of skills are required to improve the country's absorptive capacity and adoption of knowledge across sectors.

Investment in R&D

Investment in R&D, an important part of fostering innovation, is low – from both foreign and domestic sources. Foreign funding of R&D in Armenia is quite modest considering the country's rank in the 2019 GII (82/129), higher only than that of Azerbaijan (100) in the EESC sub-region. Public gross expenditure on R&D has declined steadily since 2015 (when it stood at 0.25 per cent), signifying the low priority given to science and technology policy. The officially reported figure was approximately 0.19 per cent of GDP in 2018, similar to the level in Azerbaijan (0.18 per cent) but significantly lower than the sub-regional average of 0.34 per cent (World Bank, 2020a). The official figure is a lower bound, as it includes only public sector spending.

The number of researchers in Armenia has deteriorated over the past several years, with a 12 per cent decline during the period 2010–2017, largely because of demographic trends and underfunding. According to the EU Horizon 2020 background report, natural sciences constituted 54.2 per cent of all research fields in 2018, followed by the humanities (including Armenian studies, which is growing in importance) at 14.3 per cent. At the same time, research in agriculture amounted to barely 2.1 per cent, despite the major role of the sector in the national economy (chapter I).

Industry-science linkages are few, with university-industry collaboration on research ranking 89th globally in 2019. This results from the generally low innovation capacity in the business sector, as well as the underinvestment in public science and research and insufficient alignment between the priorities of academic research and the needs of the economy.

Limited official data exist on R&D investment in the business sector. According to the report of the Pilot Survey of Innovation Activity of Legal Entities and Entrepreneurs (Armstat, 2017), 34.9 per cent of innovative enterprises engaged in in-house R&D in 2017; 33.2 per cent acquired machinery, equipment and software; and 19.6 per cent introduced innovations to the market. According to the EU Horizon 2020 background report, R&D performed in the business sector – most of it at foreign firms and some large domestic firms – concentrates predominantly in ICT and engineering, providing opportunities for knowledge absorption and innovation (EC, 2019). Indeed, as of 2018, the share of tech companies with foreign ownership was 30.4 per cent of the industry total (243) (Catalyst Foundation, 2019). By contrast, little evidence exists of innovation in small and medium enterprises (SMEs) outside the ICT sector. In 2018, about 64.1 per cent of the country's 68,600 SMEs were active in wholesale and retail trade, and in repair of motor vehicles and motorcycles; barely 9.8 per cent operated in manufacturing and approximately 5 per cent in professional, scientific and technical activities (Armstat, 2019).

Armenian researchers have a significant number of international co-publications, in part driven by the country's diaspora networks (chapter I). In 2017 these mainly focused on physics and astronomy (65 per cent of all co-publications), engineering (17 per cent) and medicine (11 per cent). The average number of citations per publication in Armenia is the highest in the EESC sub-region, followed by Georgia (6.31) and the Republic of Moldova (5.94) (EC, 2019).

Skills development

Expenditure on education has increased, but its still-low level results in problems with quality. In the 2019 GII, Armenia ranked 111th on educational investment. The share of GDP accounted for by education increased to 2.8 per cent in 2019 (from 2.3 per cent in 2017) because of the priority the Government has given to reforming the education system. Yet that share is still exceeded in all other EESC countries. In the 2019 Quacquarelli Symonds ranking, Armenia (78th) ranked lower than Ukraine (46th), Belarus (57th) and Azerbaijan (72nd). Nevertheless, in 2018, the tertiary enrolment rate was 54.6 per cent, a marked rise from the 2015 rate of 46.5 per cent (World Bank, 2020a). Growing numbers of students are specializing in economics, with an increase from 14.5 per cent to 31.1 per cent of enrolled students during 2010–2017. Consequently, the share of students in science, technology, engineering and mathematics (STEM) as a share of total enrolment has decreased slightly (from 20.5 per cent in 2010 to 18.7 per cent in 2017), ranking Armenia 88th globally in 2017.

The skills mismatch on the labour market is growing, as rapidly evolving sectors such as ICT fuel demand for highly skilled workers. Some 29.4 per cent of Armenian workers are employed in knowledge-intensive jobs. Vocational education, which attracts approximately 20 per cent of secondary school graduates, is not yet well developed, and the technical base at higher-education institutions (HEIs) is reportedly insufficient in both quality and quantity. This makes it difficult for students to transition successfully to the labour market (EV Consulting, Economy and Values Research Centre, 2010; 2017). Furthermore, only 16.2 per cent of Armenian firms offered formal training in 2019. To improve the quality of education in Armenia and to support the economic growth driven by the expanding ICT sector, investment in education should be increased.

Synthesis

This table presents the main achievements of and challenges to R&D and innovation (RDI) in Armenia, based on the findings described in this chapter.

Progress made so far

- Good overall performance in knowledge and technology outputs on the global scale
- Rise in ICT services exports and ICT access
- Significant increase in high-tech export share in manufactured goods
- Improved entrepreneurship environment, resulting in an emerging start-up movement

Challenges ahead

- Enhance human capital and research capabilities and reduce the skills mismatch on the labour market.
- Stimulate business sophistication and knowledge absorption.
- Improve the collection of data on the RDI activity of businesses.
- Increase levels of R&D investment in both the public and the private sector.

Source: UNECE.

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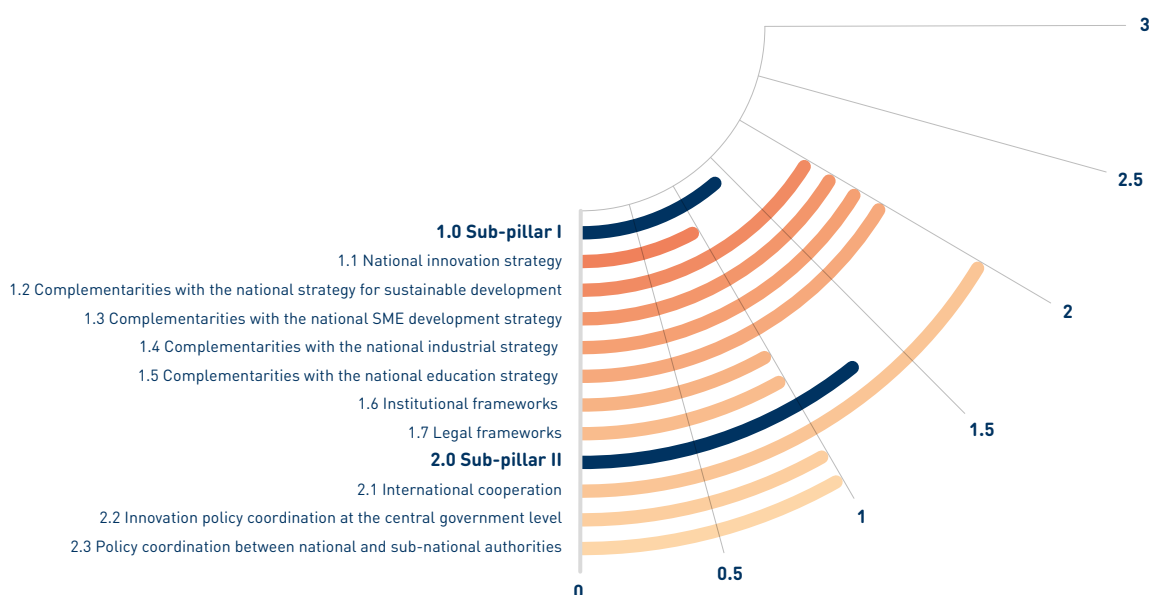
Chapter III

PILLAR I: INNOVATION POLICY GOVERNANCE

The first pillar of the IPO reviews the overarching strategic, institutional and legal framework for innovation policy, as well as the competences of and coordination among government bodies involved in innovation policy. This review assesses the extent to which innovation policy governance is sound, well-structured, efficient and flexible.

National innovation policy governance – strengths and weaknesses

Figure III.1 • Scoring of sub-pillars: innovation policy governance



Source: UNECE.

Note: Each indicator is assessed using a score from 3 to 0. The highest score (3) is given to fully fledged policy initiatives and mechanisms that can provide mutual learning opportunities for the EESC sub-region. A score of 2 is assigned if a policy initiative is operational. An indicator receives 1 point if a policy initiative is under development. The lowest score (0) is given if a country does not have a specific policy mechanism, strategic document or policy initiative. The indicators are based on an extensive questionnaire answered by national government agencies and external consultants. The questionnaire consists of open, binary and multiple-choice questions. Additional statistical data supplement the formal assessment framework by informing on key socioeconomic trends and context conditions. Statistical data are not directly integrated into the qualitative indicators but are used to guide scoring decisions. For more information, please refer to Methodology and Process.

As a small, landlocked country facing external and internal challenges, Armenia focuses on driving intensive economic growth through technology and innovation. During the last few years, the Government has launched reforms aimed at supporting science and innovation. Although the national science and innovation system is still nascent, its key elements are gradually emerging, with the creation of technology centres in Gyumri and Vanadzor and the establishment of the Granatus venture fund. In the Soviet era, Armenia formed a strong foundation in scientific research, and optics and electronics remain competitive advantages of the economy. The burgeoning growth of the IT sector builds on factors that include a large pool of skilled professionals and low capital expenditures in the sector. Other strengths include the recognition of the importance of science and innovation at the highest policymaking levels, successes in developing elements of the national science and innovation ecosystem, a well-networked diaspora that supports the development of research and business activities in Armenia, and the shared valuing of higher education by broad swaths of civil society. The state budget is under constraint, and there is a need for greater efficiency and effectiveness in policy initiatives. Legal and institutional frameworks for innovation policy are still in development. Strong mechanisms for coordinating innovation policy are also still missing, which leads to fragmented and duplicative policy efforts.

Table III.1 Overview of sub-pillars and indicators for innovation policy governance

Sub-pillar I: Innovation Policy Frameworks	Sub-pillar II: Innovation Policy Coordination
National innovation strategy	International cooperation
Complementarities with other policy areas	Innovation policy coordination within the central government and between national and subnational authorities
Institutional frameworks	
Legal frameworks	

Source: UNECE.

Sub-pillar I: innovation policy frameworks

Given the many government levels involved in the design and implementation of innovation policy, it is vital to have a strategic document containing the Government's overarching vision.

National innovation strategy

Armenia does not yet have a functional innovation strategy. The Government is developing a national strategy on science, technology and innovation-based industrial development that is expected to offer a shared vision of national science and innovation goals, identify priority areas, and consolidate the efforts and resources of stakeholders.

The draft proposes concentrating on a limited number of research fields and industrial sectors. Well-coordinated efforts aimed at developing a specific set of priority areas could help Armenian firms integrate more deeply into global value chains and create favourable conditions for economic prosperity.

The national innovation strategy focuses sharply on export orientation. As a small economy, Armenia needs access to foreign knowledge and expertise so as to fuel growth in productivity. The priority given to integrating into international research and innovation networks is reflected in a number of policy documents, including the law on scientific and technological activity and the Concept Paper on the Initial Strategy for Formation of Innovation Economy.

The development of Armenian research has been shaped by the Strategic Programme of Development of the Scientific Sector 2017–2020. The programme strives to improve governance in public organizations that conduct RDI, raise the standards for the quality of scientific research and modernize research facilities and equipment. The programme addresses the separation of education from scientific research and calls for measures aimed at fostering positive synergies between teaching and research. It also outlines measures for promoting academia-industry collaboration and strengthening international research cooperation.

Complementarities with other policy areas

In addition to the national innovation strategy, the Armenian Government is developing the national industrial strategy. It is expected to have two components. The first is oriented to modernizing traditional industrial sectors by importing skills, technologies and knowledge from the countries of the Organization for Economic Cooperation and Development (OECD). Through changes in legislation and investment into skills and supporting infrastructure, the Government plans to attain productivity growth of 2.12 per cent growth in traditional industrial sectors by 2025. Two-thirds of public expenditure under the first component of the national industrial strategy will be channelled to supporting education and R&D.

The second component of the industrial strategy is dedicated to leap-frogging to more advanced stages of industrial development. The Government sees the ongoing “next production” revolution and recent advancements in manufacturing technologies as opportunities for reducing the productivity gap between Armenia and developed countries. By 2030, it envisions the creation of a globally competitive national IT sector and tight integration of Armenian enterprises into global value chains. The strategy includes a clear logical framework (input, output, outcome and impact) for monitoring, assessing and evaluating its implementation. Within the national industrial strategy, the Government plans to launch an international mobility programme, providing the opportunity for 2.5 per cent of STEM students to have an exchange year in leading foreign HEIs.

Domestic research conditions and the technological base do not enable the growth of innovative enterprises (UNECE, 2014). Access to foreign knowledge and technology is constrained by the low levels of integration of Armenian companies into global value chains and by low FDI. Although some domestic enterprises successfully provide innovative solutions for international markets, the economy is not driven by innovation and technological intensity is low. Serious barriers to the growth of innovation include

the low demand for innovation among Armenian enterprises, the lack of a full-fledged national science and innovation system, numerous legislation gaps and problems with enforcement, and the lack of linkages among science and innovation actors.

At the same time, the industrial structure is not favourable for accelerated development of RDI. The manufacturing sector has a limited share in the economy, contributing only 11 per cent of gross value added (EC, 2018). Less technology-intensive sectors – such as agriculture – have larger shares, leading to a lower uptake of manufacturing technology and innovation. Other key challenges include the development of the equity market in the country's volatile and uncertain socioeconomic situation, a lack of mechanisms for good-quality corporate governance, and the lack of skills and capabilities among domestic enterprises for successfully transferring research findings into products and services.

In 2001, the Government recognized the ICT sector as a key priority. Investment into digital government infrastructure contributed to the emergence of an e-health system, an automated vehicle licensing system and an electronic identity card system. A recent project is the Travelinsight AI platform, designed to help the Government formulate tourism policy. The platform uses web-crawling and scraping techniques to build a picture of the positive and negative aspects of travel in Armenia. Government authorities can use insights gathered through the platform to modify tourism policy. The Armenian Electronic Procurement System has streamlined the whole procurement cycle from planning through financial transactions. Digitalizing procurement has contributed to greater accountability and transparency, creating potential gains for successful delivery of public services.

In 2008, the Government adopted a national IT development strategy for the next 10 years. The strategy targeted developing ICT infrastructure, promoting digital start-ups and creating a workforce with the required digital skills. In cooperation with foreign partners, Armenia enabled the establishment of national ICT research centres. Examples include the Armenian National Engineering Laboratories, the Armenian-Indian Centre for Excellence in ICT, the Centre of Innovative Solutions and Technologies of IBM, and the Microsoft Innovation Centre. The availability of skilled professionals and the quality of the business environment have attracted multinational IT companies such as Oracle, D-Link and Synopsis to launch R&D activities in the country. A number of IT start-ups and small and medium enterprises (SMEs) have become successful globally (World Bank, 2020).

Over several years, the Government has launched a number of policy initiatives to support the growth of ICT firms and increase the pace of job creation in the sector. Armenian ICT businesses can benefit from incentives covering taxes on profit and income. To produce positive synergies among ICT stakeholders, the Government organizes events and forums such as the ArmTech Congress and the annual DigiTech Business Forum.

To reduce the mismatch between education and the needs of the job market, the Ministry of Education, Science, Culture and Sport (MoESCS) is preparing a set of reforms designed to bring about positive changes in 10–15 years. They seek to make the education system more responsive to the needs and demands of industrial development. New curricula for secondary education, to foster STEM skills and spark creative and innovative thinking, are expected to be adopted in the near future. There are plans to raise teacher salaries to the level of the average salary in the country. The MoESCS cooperates with other government authorities and international partners on introducing new terms of work and sets of incentives for teachers. Jointly with private sector representatives, the ministry

has introduced new principles of lifelong training for adults and offered online training courses. It seeks to align national education with the Sustainable Development Goals (SDGs). National education guidelines are being developed using the UNICEF framework and the Council of Europe frameworks for democratic culture.

Other reforms aim to strengthen synergies between research and education. Mergers of some public research institutions and HEIs will take place in the near future. The number of HEIs will decrease, to consolidate resources and improve the quality of education and research. An important direction of ongoing reforms is promoting business entrepreneurship. The MoESCS is working on changing behaviours and attitudes in the research community to be more entrepreneurial. The allocation of public research funding will be rationalized and will be based on the national science priorities defined for five years. The ministry is also planning to increase project-based funding to provide organizations that perform RDI with additional resources and incentives to foster research excellence.

Institutional frameworks

Armenia is undergoing some institutional changes that affect responsibility for policymaking. The newly established Ministry of High-Tech Industry is the main government body in charge of formulating and implementing the national innovation policy. The Ministry of Economy will support technological upgrading and innovation in traditional industrial sectors, while the Ministry of High-Tech Industry will promote innovation in high-technology sectors. The decision to split responsibility for innovation policy between two ministries may be logical from an operational viewpoint; however, it will be important to ensure sufficient levels of coordination to prevent fragmentation of policy efforts.

The Science Committee of the MoESCS has been the main government body responsible for formulating, designing and implementing science policy since 2015. The committee supports the development of scientific research and fosters linkages between academia, industry and education.

The National Academy of Sciences of Armenia, the main body performing research, consults on policy, though its participation is becoming more constrained. In addition to conducting R&D activities at its 33 research institutes, the Academy provides informed advice to the Government on issues related to science, technology and innovation policy. The Academy is directly subordinate to the Government and operates with a large degree of autonomy. New laws introduced by the MoESCS seek to diminish the role of the Academy in science policy. Other public research institutes include 12 State HEIs and 23 branch State research organizations.

The SDG Innovation Lab, an innovation hub for the Government, aims to accelerate the implementation of the SDGs and their alignment with Armenian national priorities. It is actively involved in pioneering behavioural studies, data analytics and citizen-centred research approaches. To monitor progress in achieving the SDGs, it operates an SDG barometer. Co-founded by the Government and the United Nations Development Programme (UNDP), the Lab operates under the aegis of the UNDP but with the status of a government body. It is co-chaired by the Prime Minister and has several deputy chairs, including the UNDP representative in Armenia and the Chief of Staff of the Office of the Prime Minister. It collaborates constantly with government agencies and

cooperates with the UN. The SDG Innovation Lab maintains close cooperation linkages with international partners including the United Kingdom's Good Governance Fund, the EU, the World Bank, NESTA, the Asian Development Bank and the Russia-UNDP Trust Fund.

Through focal points in all ministries, the Lab identifies and aggregates data on SDGs that are scattered across government bodies. To increase the low numbers of people getting health check-ups, it launched behavioural studies for the Ministry of Health, with the support of the World Bank. Subsequently, the rate of check-ups increased by 320 per cent. The Lab is also diversifying its portfolio of projects in tourism and education.

Legal frameworks

The Law "On State Support for Innovation Activities", adopted by the National Assembly in 2006, is the main legal document in Armenia defining the scope of innovation policy and the roles of government authorities. Now outdated, it requires revision in order to fully reflect the current policy agenda and recent socioeconomic and technological trends.

Armenia is one of the few post-Soviet states that has designed a regulatory framework for the development of venture capital funds. Whereas in other EESC countries venture capital legislation is still at the early stages of development, Armenia had created a public-private venture fund to support the ICT sector as early as 2013. Despite the forward-looking aspect of some policy initiatives, however, legal frameworks in Armenia remain largely outdated. The Law on Investment, for example, was adopted in 2010 to develop the national investment framework and improve financial intermediation in the business sector. It needs to be updated to improve framework conditions and create a solid foundation for the growth of innovation.

Definitions of start-ups and university spin-offs should be articulated well in the national legislation in order to enable policymakers to formulate support measures. Gaps in national legislation also include laws on technology transfer and fiscal support of procurement related to R&D and innovation (RDI). Public procurement is not perceived as a policy instrument for supporting innovation. Instead, corruption and risk management are the main foci. The Government may want to explore public procurement mechanisms that could spark innovation activities in the business sector. Caution is required, however, as public procurement frameworks may unintentionally support poor technological solutions and decrease the quality of public services. There is a danger that public procurement can provide privileged positions for local businesses and decrease their global competitiveness.

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ The Government has recognized innovation as the national priority at the highest policymaking level.
- ✓ Armenia has made progress in fostering public sector innovation across government agencies.
 - ✓ The ICT sector is relatively strong.
 - ✓ A public-private venture fund exists to support ICT.

Sub-pillar I IPO evaluation and recommendations (Concluded)			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Funding of research and innovation activities is low. 	<ul style="list-style-type: none"> ✓ Increase funding for RDI, while improving the governance of government authorities responsible for science and innovation and supporting higher standards of governance in public grant recipients. 	Long-term	Government
<ul style="list-style-type: none"> Legal frameworks for innovation policy are outdated. Regulations are missing, as are terms defining the actors in innovation processes. 	<ul style="list-style-type: none"> ✓ Adopt legal acts that introduce the terms “start-up” and “university spin-offs” into policymaking. 	Medium-term	Government
	<ul style="list-style-type: none"> ✓ Update legal acts on RDI to reflect the national agenda for innovation policy and recent socioeconomic and technological trends. 		
	<ul style="list-style-type: none"> ✓ Adopt legal acts on technology transfer, to accelerate academia-industry collaboration. 		
<ul style="list-style-type: none"> Science policy is separated from innovation policy. 	<ul style="list-style-type: none"> ✓ Design holistic policy approaches that will use the multiple synergies between science and innovation policies to bridge the divide between business and academia. 	Medium-term	Government
<ul style="list-style-type: none"> Innovation policy lacks the full support of long-term planning arrangements. 	<ul style="list-style-type: none"> ✓ Introduce robust mechanisms for prioritizing research and industrial fields, to consolidate resources for strengthening national competitive advantages. 	Medium-term	Government
<ul style="list-style-type: none"> Innovation procurement frameworks are not implemented. 	<ul style="list-style-type: none"> ✓ Explore the potential of public procurement to accelerate innovation growth. 	Short-term	Government

Source: UNECE.

Sub-pillar II: innovation policy coordination

Coordinated approaches help avoid overlapping, duplicating or omitting actions required to implement innovation policy successfully.

International cooperation

Positioned between several economic and knowledge blocs, Armenia has the potential to benefit from international cooperation in science and innovation. Through its diaspora it has strong relations with many countries. In 2015, the Government signed a Trade and Investment Framework Agreement with the United States, which provides a platform for investment and economic cooperation. In 2016, Armenia acquired the status of an Associated Country with the EU's Horizon 2020 programme. That granted the opportunity for Armenian research and business organizations to compete for funding with European counterparts and explore opportunities for joint research. As of 2019, 40 such organizations had received funding from the programme. In parallel with developing collaboration with the EU countries, Armenia seeks to deepen relations with

the Russian Federation. In 2015, Armenia joined the EAEU, which supports regional cooperation across economies, financial policy, industry and agriculture. The EAEU harmonizes the technical regulations of member states, supporting the integration of enterprises into international markets. Membership opened up access by Armenian firms to the single market of the Russian Federation, Belarus, Kazakhstan and the Kyrgyz Republic. As a member of the WTO since 2003, Armenia has a liberal investment regime, making it an attractive location for international companies.

Armenia maintains collaborative efforts with leading countries in science and technology. It has signed science cooperation agreements with approximately 40 such countries in Europe, Asia and North America. Domestic research organizations contribute to such international research projects as the ALICE (A Large Ion Collider Experiment), Apparatus and Compact Muon Solenoid projects of the European Organization for Nuclear Research.

Innovation policy coordination within the central government and between national and subnational authorities

To date, Armenia has not developed mechanisms for coordinating innovation policy, so the policy landscape remains largely fragmented. Policymakers develop science and innovation initiatives in isolation, without a holistic vision. No joint working groups or specific councils exist to support joint development of innovation policy. Central and regional authorities do not coordinate with each other, and no systematic communication channels are specifically dedicated to exchanging experiences with innovation policy issues at the subnational level. Subnational units do not have innovation strategies or plans that complement the national innovation policy framework.

Sub-pillar II IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Armenia has strong linkages with many countries through its diaspora. ✓ The Government has international agreements on trade, industry and research with countries leading in science and technology as well as the EU. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • No mechanisms for coordinating innovation policy exist at the central government level. 	<ul style="list-style-type: none"> ✓ Establish a national council for coordinating innovation policy and joint working groups among ministries, to strengthen synergies among innovation policy initiatives. 	Medium-term	Government
<ul style="list-style-type: none"> • No mechanisms exist for coordinating innovation policy between national and subnational authorities. 	<ul style="list-style-type: none"> ✓ Explore opportunities to foster research and innovation activities beyond the capital region, perhaps having regional authorities support the implementation of national policy by managing infrastructure (start-up centres, technology centres) or project management offices. 	Medium-term	National and regional government

Source: UNECE.

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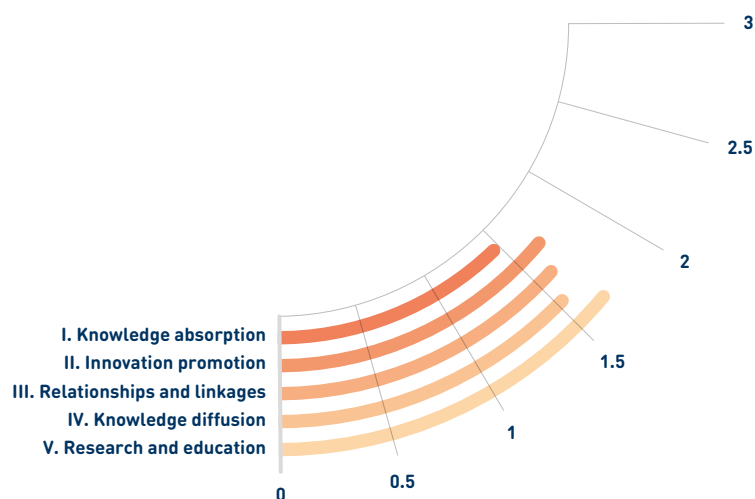
Chapter IV

PILLAR II: INNOVATION POLICY TOOLS

This chapter reviews the policy mechanisms in Armenia that enable, promote and diffuse innovation. It addresses five sub-pillars: knowledge absorption, innovation promotion, relationships and linkages, knowledge diffusion, and research and education.

National innovation policy mix – strengths and weaknesses

Figure IV.1 • Scoring of sub-pillars: innovation policy tools



Source: UNECE.

Note: The IPO pillar scoring is calculated on the basis of the average quantitative assessment of individual indicators under each sub-pillar. In the evaluation, all support measures in a given area are taken into account and special consideration is paid to indirect contributions from external mechanisms. The overall band score for each sub-pillar forms the following generalized categories: 0.0–0.5, No policy instruments/mechanisms exist; 0.5–1.5, Policy efforts are in their initial stage of development; 1.5–2.5, Policy efforts are evident and partial implementation takes place; 2.5+, Policy efforts are comprehensive and monitoring activities are systematic. The scores for individual indicators are as follows: 0, No policy instrument/mechanism exists; 1, A policy measure/s is/are under development/has/have partial or indirect impact; 2, A policy scheme/s is/are operational and implementation has started; 3, Implementation is advanced and evaluation/impact assessment is taking place. Policy measures with sector-specific or partial or non-targeted impact on a given area are subject to case-by-case evaluation. For a more detailed discussion on the IPO scoring methodology, please refer to Methodology and Process.

Innovation is among the priorities of the Government’s agenda to support sustainable development, the Development Strategy 2014–2025. The demographic and economic challenges facing Armenia (chapter I) make it increasingly important to apply effective policy support measures so as to build on the potential for productivity-driven growth. The IPO analysis of innovation policy tools identified relatively strong performance by Armenia on the sub-pillars of *Innovation promotion* and *Research and education*, as well as several areas that need improvement within the sub-pillars of *Knowledge absorption*, *Knowledge diffusion*, and *Relationships and linkages*. Recent years have shown positive developments in start-up and SME support, digitalization and education. Emerging linkages between industry and science lay the foundations of a dynamic innovation ecosystem. Significant progress has been made in ICT, in particular, with well-established international networks and support infrastructure. Overall, however, several issues remain, including overreliance on international donor support, gaps in early-stage business development and a lack of broader demand-driven policies for innovation on the domestic market, as the potential for public procurement to stimulate demand is not sufficiently explored. Thus, sustaining high levels of cross-border research cooperation and optimizing the potential of diaspora networks for science and innovation remain integral for Armenia’s transformation into a knowledge-based economy.

Table IV.1 Overview of sub-pillars and indicators for innovation policy tools

Sub-pillar I: Knowledge Absorption	Sub-pillar II: Innovation Promotion	Sub-pillar III: Relationships and Linkages	Sub-pillar IV: Knowledge Diffusion	Sub-pillar V: Research and Education
Promotion of public and private sector organizational and managerial practices	Business plan and start-up competitions	Innovation voucher schemes	Information and brokerage schemes for technology upgrading	Policies to increase the number of science, technology, engineering and mathematics graduates
Schemes to support the development of technical and business services	R&D loans	Cooperative R&D grants	Standards, testing and certification instruments for SMEs	Policies to foster research development
Fiscal incentives for acquiring knowledge capital	VAT exemptions	Supplier matching services	Industrial technology assistance programmes and extension services for SMEs	
	Technology incubators	S&T parks	Public procurement for innovation	
		Innovation spaces	Digitalization	
		Technology accelerators		
		Business networks and clusters		
		Academia-industry linkages		
		Diaspora networks		
		Gender equality		

Source: UNECE.

Sub-pillar I: knowledge absorption

The process of assimilating external knowledge plays a substantial role in developing dynamic core competencies, as well as in gaining competitive advantage and creating new value chains.

Promotion of public and private sector organizational and managerial practices

Projects to promote organizational and managerial practices in the private sector are implemented in Armenia by the Fund Investment Support Centre (ISC) (formerly the Small and Medium Enterprise Development National Centre, or SME DNC), established in 2002. Funded from the State budget, the ISC provides business services and support – including training, consultation and networking – to local companies on a competitive basis. In addition, the Republican Union of Employers of Armenia supports the implementation of ISO management standards by providing training and mentorship for SMEs and entrepreneurship development support for women. Nevertheless, the SME Development Strategy 2016–2018 highlighted weaknesses in public and private sector management (Armenia, 2015); the 2020–2024 edition of the strategy, which was approved in 2020, aims to foster the development of entrepreneurial skills.¹ Recently the Government introduced entrepreneurial learning in the curricula of primary and higher education as well as vocational education and training, according to the OECD's SME Policy Index 2020. It took these steps despite the lack of more broadly coordinated collection of data on the need to develop skills (OECD and others, 2020). According to the latest EU4Business survey of SMEs in Armenia (2018), the principal issues for business development are weak business management skills, lack of transparency and low corporate governance standards (EU4Business, 2018).

In the public sector, R&D activities are pursued mainly in public research institutes and state non-profit organizations. Quality management tools have been used more since 2015, when the Common Assessment Framework guidelines were developed as part of the “Excellence in the Public Sector” project of the EU. The Civil Service Council (the implementing body) was dissolved in 2018, and capacity-building activities are relatively new in the field. In 2018, UNDP Armenia held a public sector innovation week as part of the EU-funded “Innovation for Development” project, which supported the implementation of innovative ideas in the public sector.²

Schemes to support development of technical and business services

The development of business support services in Armenia relies mainly on donor-assisted projects in the private sector and on business consulting companies. One long-term support facility is the EBRD's «Advice for Small Businesses» project, which aims to facilitate and promote the use of business support services by SMEs in Armenia (EBRD, 2020). Following the end of that project, the SME Finance and Advice Facility was established in 2017. The ISC supports market development in business support

services by linking SMEs and private providers of technical and business services through its website and outsourcing some of its business services. Until recently, SMEs could obtain consultations for business development and for user-centred strategies for commercializing innovation through the EU4Business project “Support to the SME Development in Armenia” (SMEDA³). According to the OECD and others (2020), 23 per cent of Armenian SMEs benefited from publicly funded and co-funded business development services in 2017, the second highest share in the sub-region after Georgia (48 per cent). Yet room for improvement exists: a lack of quality assurance or reputational mechanisms, low awareness of the availability of services and limited financial resources are the main frictions in moving towards sustainable, market-based provision of technical and business services.

Fiscal incentives for acquiring knowledge capital

Fiscal stimulation for innovation is regulated in Armenia under the national tax code. It has included a support scheme for tech start-ups (with a 10 per cent tax on income and a 0 per cent tax on profit) that is scheduled to run from 2015 to 2022. Under the scheme 777 IT and high-tech start-ups have been created. Indirect incentives to innovative firms include deferral of value added tax (VAT) payments and exemptions from customs duties (for imports from non-EAEU countries) for technological equipment and capital goods imported within the scope of approved investment projects. In 2017, VAT payment deferrals amounted to approximately \$20 million, under 27 investment projects that created 1,440 jobs. Tax relief on profit tax, VAT, property tax and customs duties is granted to the residents of Armenia’s three free economic zones, including the Alliance zone in Yerevan, which hosts a number of R&D and high-tech businesses. Yet the lack of a comprehensive estimate of the total financial costs of tax incentives obstructs accurate assessment of the value of such schemes to the economy (EV Consulting, 2018).

Sub-pillar I		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ A dedicated government agency for SME development (the ISC) supports local entrepreneurs through services and capacity-building activities, while creating linkages with private providers of technical and business services. ✓ Indirect R&D support in the form of fiscal stimulation has helped create jobs and develop the IT sector in recent years. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The policy tools for knowledge absorption do not sufficiently promote good organizational and managerial practices in the public sector. 	<ul style="list-style-type: none"> ✓ Develop a dedicated scheme for promoting organizational and managerial practices in the public sector. 	Medium-term	Office of Civil Service of the Prime Minister
	<ul style="list-style-type: none"> ✓ Provide training to public servants on the basis of assessed needs and international good practices. 		

Sub-pillar I IPO evaluation and recommendations (Concluded)			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The provision of technical and business services is not yet fully market-based and relies predominantly on State and international donor support. 	<ul style="list-style-type: none"> Introduce a co-financing mechanism specifically targeting technical and business services to stimulate market-based service provision. 	Medium-term	ISC
	<ul style="list-style-type: none"> Introduce quality assurance and reputational mechanisms to boost business sector development in the field and instil trust in the use of private technical and business services. 	Medium-term	Ministry of Economy
	<ul style="list-style-type: none"> Raise awareness of the availability of technical and business services and their importance for early-stage business development. 	Short-term	ISC
<ul style="list-style-type: none"> Comprehensive assessment is needed of the available targeted fiscal incentives for innovation. A comprehensive estimate of the total financial costs of tax incentives is not publicly available. 	<ul style="list-style-type: none"> Conduct a comprehensive assessment of current tax privileges to examine their effectiveness for stimulating innovation. 	Medium-term	State Revenue Committee
	<ul style="list-style-type: none"> Generate and report data on the financial costs of all tax incentives. 		

Source: UNECE.

Sub-pillar II: Innovation promotion

Promoting innovation requires governments to invest in establishing platforms where young companies can develop and test innovative ideas.

Business plan and start-up competitions

The development of Armenia's business scene is strongly supported by various donor initiatives that stimulate innovation through direct and indirect financial support (table IV.3). For instance, the EU4Business SMEDA project has supported start-ups with training, competitive grants and technical assistance. As of 2019, it had awarded Innovation Matching Grants or Science and Technology Entrepreneurship Programme (STEP) grants to 34 start-ups that were realizing technology-based projects in engineering, cleantech and high-tech. The awards included access to seed funding, mentorship and networking opportunities. Successful Start, a regionally implemented State programme, supports the establishment of start-ups in food processing and tourism. In 2018, the programme helped 238 start-ups (out of 303 participants) develop business plans; this help included training, professional consulting and financial support for the winning projects, including small business loans of approximately \$10,000. Events organized over the past several years to support the growing start-up movement include the Armenia StartUp Cup (organized by the International Academy of Business in 2016) and the Sevan Startup Summit (co-sponsored by the EU-SMEDA project in 2019), providing mentorship, grants and investor linkages.

Table IV.3 Selected support programmes for RDI

Support programme	Implementing body	Programme objective	Scheme value	Year introduced
Horizon 2020	European Union	Provide RDI funding for multinational collaboration and individual projects.	Approximately €80 billion total for all participating countries	2014
SME Competitiveness Programme	European Union	Promote an entrepreneurial culture and improve SME competitiveness.	€2.3 billion total for all participating countries	2016
Innovation Matching Grants (EU4Business-SMEDA)	GIZ PSD SC Regional Programme, EIF	Stimulate technology absorption, research commercialization and industry-science collaboration.	€30,000–50,000 per grant	2017
Science and Technology Entrepreneurship Programme (STEP) Grants (EU4Business- SMEDA)	GIZ PSD SC Regional Programme, EIF	Support the development of innovative products on the domestic and global markets.	Up to about €3,600 per grant	2018
Innovation and Regional Matching Grants (World Bank, Trade Promotion and Quality Infrastructure Project)	EIF, World Bank	Stimulate innovative development by directly funding joint innovation projects (up to 50 per cent) and regional matching grants (up to 85 per cent).	€10,000–50,000 per grant	2019
Neruzh	Ministry of High-Tech Industry	Support diaspora entrepreneurs in launching start-ups in Armenia.	Up to €259,000	2019
From Idea to Business	Ministry of High-Tech Industry	Support disruptive ideas, development of innovation, and commercialization of processes and products.	Up to €1.72 million total	2020
"Cooperation between University and the Private Sector for the Preparation of Specialists" Programme	Ministry of High-Tech Industry	Support industries that suffered the most from the pandemic, as well as reduce the gap between demand for and supply of employees with appropriate skills in the high-tech sector.	Up to €691,000 total	2020
COVID-19 grants	Ministry of High-Tech Industry	Prevent COVID-19, develop effective and innovative solutions.	Up to €193 million total	2020
Lung ventilator grants	Armenian Engineering Association	Produce lung ventilation machines.	Up to €155,300 total	2020
Government programme addressing economic impact of COVID-19	Various	Support companies registered within the last two years.		2020
Innovation Grants Programme	Ministry of High-Tech Industry	Help service companies that have been registered for more than two years to start investing in developing products.	Up to €570,000 total	2020
Experienced Companies Grants Programme	Ministry of High-Tech Industry	Support start-ups that may attract investment until December 2020 by providing 100 per cent co-financing grants of up to €54,000.	Up to €794,000 total	2020
Matching Grants programme	Ministry of High-Tech Industry	Support businesses in using innovative solutions to overcome economic difficulties.	Up to €155,000 total	2020
Support Programme: Innovation for economic recovery for micro, small and medium-size non-tech companies (EU4Business, "Innovative Tourism and Technology Development For Armenia")	GIZ PSD SC Regional Programme	Develop in companies digital and entrepreneurship skills. Hold a competition for business model presentations.	Up to € 10,000 (maximum of 15 grants)	2020
Government programme addressing the economic impact of COVID-19	ISC	Provide soft loan financing.	Up to €18,000 for start-ups Up to €35,000 for businesses with an innovative business plan	2020

Source: UNECE and Armstat (2020) for information on Neruzh and all 2020 programmes.

Support for RDI investment

Although preferential R&D loans are not yet available in Armenia, since 2009 the ISC has offered a loan guarantee provision programme covering up to 70 per cent of the loan principal, to help local entrepreneurs develop their businesses. In addition, according to the Tax Code that entered into force in 2018, scientific research that complies with the standards set by the Government is exempt from VAT (Armenia, 2016, art. 64, part 2, point 3; art. 121, part 6). Nevertheless, the level of innovation activity remains low (chapter II), and the lack of equity-based financing is among the main bottlenecks to innovation on the domestic market. Business angel and venture capital investment are scarce and relatively new to the Armenian business scene. Only two venture capital companies provide funding, expertise and network access to technology-based start-ups: SmartGateVC (founded in 2017) and Granatus Ventures (the first venture capital firm in Armenia, established in 2013 with investment from the World Bank and members of the Armenian diaspora).

Technology incubators and accelerators

A main player in innovative development and one of the largest IT development agencies in Armenia is the Enterprise Incubator Foundation (EIF), established jointly by the Government and the World Bank in 2002, within the framework of the Bank's Enterprise Incubator project. The EIF supports the development of the ICT sector, creating a productive environment for innovation, technological advancement and company growth. In addition to implementing several competitions, including the business development and innovation grant contests within the EU and World Bank projects (see table IV.3), the EIF conducts joint projects for developing innovation support infrastructure, networking and venture investment (chapter V). The Gyumri and Vanadzor Technology Centres, established by the Government and operated by the EIF with funding from the World Bank, provide incubation services for technology start-ups, mainly in IT and engineering. In 2013, UNDP and UNICEF created the Kolba Social Innovations Lab, a social venture incubator and design lab for Armenia. It mobilizes innovators and supports start-up development through events such as the Smart City Data Hackathon (2017), the Startup Cup on Education (2017) and the Innovation Challenge on Education (2017). In addition, the privately owned ViaSpere Technopark in Yerevan has provided infrastructure and incubation services to companies, mainly in the ICT sector, since 2001.

Technology acceleration programmes are relatively new to the Armenian innovation landscape, with several recently launched at technology centres, including Gyumri and Vanadzor. They mainly target local IT specialists, engineers and start-ups. The first tech accelerator was the Start-up Academy, established with the support of the EU-SMEDA project in 2017. In 2018, the Climate Change Technology Accelerator was established by UNDP Armenia and ImpactAim VA, in cooperation with the Innovative Solutions and Technologies Centre Foundation. The Founders Institute Yerevan and the EIF offer a sustainable mechanism for promoting innovation and technological solutions in climate change adaptation and mitigation activities related to agriculture and forestry. Despite these recent positive developments, the lack of a clear policy and institutional framework for technology incubators and accelerators inhibits the creation of strong linkages and coordination between separate structures. In addition, regional centres reportedly operate below full capacity, often lacking skilled workers and modern equipment.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ Competitive programmes for RDI have been launched across the country with the support of international organizations, stimulating start-up development and job creation.
- ✓ Several innovation and technology centres provide incubation services to start-ups, and acceleration programmes are beginning to emerge, supporting a growing start-up movement and setting the foundations of a well-functioning innovation ecosystem.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Low access to finance inhibits the product development cycle of innovative projects, and the financial support instruments targeting RDI are insufficient to bridge the gap in the early stages of start-up development. 	<ul style="list-style-type: none"> ✓ Expand equity investment instruments (possibly in cooperation with international partners) to support the growth of innovative production that is based on global best practices. 	Medium-term	Relevant ministries and State authorities
	<ul style="list-style-type: none"> ✓ Introduce a diverse set of financial support instruments (such as preferential R&D loans, VAT exemptions on innovative goods and intermediary inputs) to bridge the gap in access to finance at early development stages and stimulate production of innovative goods. 		Ministry of Economy ISC Relevant state authorities
<ul style="list-style-type: none"> • The policy tools for technology incubation and acceleration are not guided by a clear policy and institutional framework, leaving service portfolios of different structures unstandardized and regional centres operating below full capacity. 	<ul style="list-style-type: none"> ✓ Improve the policy and institutional framework governing technology incubators and accelerators. 	Short-term	Ministry of High-Tech Industry Relevant ministries and state authorities
	<ul style="list-style-type: none"> ✓ Ensure regular monitoring, data collection and impact assessment of innovation support structures across all sectors of the economy. 		
	<ul style="list-style-type: none"> ✓ Consolidate a set of standards for technology incubators to improve the quality of services provided at support structures across the country, and to assist with developing the workforce and acquiring modern equipment at regional centres. 		

Source: UNECE.

Sub-pillar III: Relationships and linkages

Schemes that promote linkages between science and industries help create innovative ecosystems by assisting scientists and businesspeople in commercializing research, creating products and developing organizational processes.

Business networks and clusters

The formal platforms for business collaboration in Armenia are business associations and chambers of commerce and industries. Business networking is also supported by donor-financed private sector development projects. Furthermore, as a member of the Enterprise Europe Network, the ISC offers business matchmaking services in addition to providing information on international cooperation. Cross-sectoral and sectoral business

unions also help develop business networks; they include the Chamber of Commerce, the Union of Manufacturers and Businessmen of Armenia, the Union of Advanced Technology Enterprises and the Union of Employers of Information and Communication Technologies. A remaining issue for business unions is their limited financial resources, restricting the scope of their activities and inhibiting further development.

Sectoral and geographical clusters have been established in the creative industries (including the fashion and design and the film subsectors), as well as in engineering and start-up ecosystems (EU4Business, 2019). Stimulation of clusters occurs mostly through ad hoc projects financed by donors (such as the United States Agency for International Development, the EU and GIZ) and is also part of Armenia's export-led industrial strategy. An engineering city is being established in Yerevan, implemented by the EIF through a public-private partnership between the Government and a consortium of private companies, aiming to create an enabling environment for engineering companies in the high-tech sector.

Innovation support infrastructure

The innovation support infrastructure in Armenia consists of innovation and technology centres, focused mainly on IT and engineering. The technology parks in Gyumri and Vanadzor are among the largest elements. Their portfolios have developed over the past several years through consultancy and training programmes as well as forums and events. Other elements that support innovative development include the Innovative Solutions and Technologies Centre Foundation at Yerevan State University, as well as the Microsoft Innovation Center and the Armenian National Engineering Laboratories at the National Polytechnic University. The last two are educational and research facilities established at leading universities, by Microsoft (United States) and National Instruments (United States), respectively. Others include the IBM Innovative Solutions and Technologies Center (IBM, United States), and Regional Mobile Application Laboratories ECA (Nokia, Finland).

Academia-industry collaboration and mobility

Collaboration between research and businesses in Armenia is modest, with some pilot initiatives introduced in recent years to create industry-science linkages. Although non-competitive financial support in the form of innovation voucher schemes is not available, local scientists and technological professionals have been encouraged to collaborate with firms competitively through the STEP, jointly organized by the Government, the EIF and the United States Civilian Research & Development Foundation. In 2015, the programme's Business Partnership Grant Competition funded 5 joint projects and supported 26 individual projects in commercializing innovative ideas; applicants were required to provide 10 per cent funding from industrial counterparts. In addition, the Convergence Centre for Engineering and Applied Science – a proposed public-private partnership between international donors, educational institutions and IT companies (initiated by the TUMO Centre for Creative Technologies) – aims to increase the number and qualifications of Armenian engineers and technology professionals, as well as modernize technology education at universities. As of 2019, Armath Engineering Laboratories had been introduced in 575 schools as part of a partnership framework with the MoESCS and the Union of Advanced Technology Enterprises. A recurring issue is that researchers do not actively participate in the labour market, and no instruments for evaluating researchers have been introduced yet. Industry-

science linkages thus remain weak, with some fragmented collaboration that relies on ad hoc, donor-driven projects. In light of these shortcomings, a pilot project for developing R&D in the business sector is under development in a joint initiative of the National Center of Innovation & Entrepreneurship of the Ministry of Economy with the Science Committee of the MoESCS.

Diaspora networks

Harnessing the potential of Armenia's large diaspora (estimated at 6–8 million people) is integral to the innovative development and sustainable growth of the economy. Indeed, the diaspora plays an important role in the economy, especially in science and technology (chapter II). Several support mechanisms exist for creating strong linkages with Armenian communities worldwide. In 2019, the Government established the Office of the High Commissioner of Diaspora Affairs to elaborate a strategy for mobilizing the diaspora potential as well as to leverage diaspora knowledge and investment for economic growth. The Armenian Trade Network, established in 2011, aims to connect Armenian chambers of commerce and business entities within the diaspora by promoting linkages within the global Armenian business community. The Foundation for Armenian Science and Technology, launched in 2016, further aims to mobilize the scientific, technological and financial resources of Armenian and international communities. In 2018 it initiated the Science and Technology Angels Network, uniting investors and entrepreneurs of Armenian descent living abroad who provide financing, consulting and mentoring to start-ups in Armenia. The non-profit global network ArmTech, a recurring event, attracts industry professionals and high-level executives from abroad to improve international cooperation with the Armenian high-tech industry. Several foreign-based diaspora organizations promote cooperation between Armenia and countries around the globe, including the Analysis Research & Planning Institute of Armenia and the Armenian Engineers and Scientists of America. In 2019, over 3,000 people across four countries participated in the Armenian Diaspora Survey. Led by a team of academics, researchers and experts, the survey provided useful data to institutional and community diaspora leaders and to policymakers in Armenia (Armenian Institute, 2019).

Gender equality

Gender equality in Armenia has been ensured by the Constitution since the country's independence (Armenia, President of the Republic, 2015). Public programmes implemented by the State Employment Agency continuously promote women's participation in the labour force, and projects on women's empowerment and entrepreneurship are supported by international donors (the United States Agency for International Development, the EBRD, the Small Business Administration and the Asian Development Bank) and local non-profit organizations, such as the Armenian General Benevolent Union.⁴ Ten Women Entrepreneurs' Clubs have been established since 2018 with EU support to empower female entrepreneurs through networking and capacity-building. The low representation of women in governance and decision-making is further addressed by UNDP Armenia, which runs several initiatives on gender equality, including Women in Local Democracy (phase 2: 2017–2019), Women in Politics (2018–2021) and Gender Equality in Public Administration in Armenia (2019–2020). Moreover, according to the ICT statistics registry run by the Ministry of High-Tech Industry, about 40 per cent of Armenian women are involved in high-tech – a high rate both across the EESC sub-region and beyond. Despite these positive results,

issues remain, such as the low participation of women in the labour market, with 40 per cent of women with tertiary education unemployed and a persistent gender pay gap (20 per cent as of 2019).⁵ Combining work and family life poses continuous difficulties (48 per cent of unemployed women cited family responsibilities as a reason).

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ Armenia has developed infrastructure that supports innovation in the ICT and engineering sectors, providing a range of services, facilities and modern equipment to start-ups and innovative companies.
 - ✓ Competitive financial incentives for industry-science collaboration have been introduced with international donor support.
 - ✓ Well-established diaspora networks participate in developing the innovation, science and technology fields in the country.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Business and innovation networks are not sufficiently well developed and lack matching services to support SMEs with limited capacities and resources. 	<ul style="list-style-type: none"> ✓ Introduce supplier matching services to facilitate business linkages and accelerate innovation, benefiting both buyers and suppliers on the domestic market. 	Medium-term	Ministry of Economy Other relevant ministries and authorities
	<ul style="list-style-type: none"> ✓ Develop a framework for developing clusters to stimulate technology transfer, networking and information dissemination in priority sectors. 	Short-term	Other relevant ministries and authorities
<ul style="list-style-type: none"> • Industry-science collaboration and mobility are weak, obstructing the creation of linkages, with public research institutions often working in isolation from the private sector. 	<ul style="list-style-type: none"> ✓ Introduce direct incentives for industry-science collaboration in the form of an innovation voucher scheme, to create linkages between Armenian businesses, researchers and education institutions. 	Medium-term	MoESCS Science Committee Other relevant ministries and authorities
	<ul style="list-style-type: none"> ✓ Introduce support tools for evaluating researchers and improving mobility between academia and industry (such as traineeships, internships and vocational programmes) to create synergies between fundamental and practical knowledge and to meet industry needs. 	Short-term	MoESCS Science Committee Other relevant ministries and authorities
<ul style="list-style-type: none"> • The elements of the innovation infrastructure do not sufficiently support linkages and innovative business development in sectors other than ICT and engineering. 	<ul style="list-style-type: none"> ✓ Develop a long-term framework for developing innovation infrastructure. 	Short-term	Ministry of Economy MoHTI Other relevant ministries and authorities
	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of infrastructure elements and identify investment priorities, ensuring that support for innovation is provided in all sectors. 		
	<ul style="list-style-type: none"> ✓ Consider supporting the establishment of a science and technology park (possibly in cooperation with partner organizations) to support the development of technological entrepreneurship and create conditions for realizing their science and industrial potential. 	Medium-term	EIF
<ul style="list-style-type: none"> • Despite some positive developments, issues in gender equality persist, including low female labour-force participation and a gender pay gap. 	<ul style="list-style-type: none"> ✓ Mainstream gender equality principles at all stages of the policymaking process, ensuring that gender-disaggregated data collection and regular assessment are implemented to identify areas of intervention. 	Short-term	Relevant ministries and authorities

Source: UNECE.

Sub-pillar IV: Knowledge diffusion

Mechanisms that ensure equal and widespread access to information are vital to creating an innovative ecosystem in both the public and the private sector, serving as channels for the distribution and intersectoral flow of information.

Standards, testing and certification

The National Institute of Standards gives an annual award in the field of quality of products and services. The Institute's laboratory has modern equipment for testing foodstuffs, radio and electronic equipment, petroleum products and chemicals, and its training centre certifies experts in standardization and conformity assessment. A web portal provides one-stop access to ISO standards and publications. A main issue in Armenia is the low awareness of ISO standards, especially in rural areas, and the importance of quality certification for the competitiveness of Armenian businesses. Instruments for standards, testing and certification of SMEs have not yet been put in place.

Digitalization and e-governance

The Armenian economy has achieved high connectivity over the past several years, with 96 per cent of households and 83 per cent of SMEs having internet access. In 2015, the project "Supply and Installation of Wireless Internet Access Devices in Villages of Republic of Armenia" – implemented by the Government with the EIF and the World Bank – provided free internet access in 344 rural areas. In addition, the Digital Transformation Agenda of Armenia 2030 includes a series of short-term programmes for creating smart e-government, developing a digital labour force and enhancing cybersecurity, as well as large-scale investment for expanding the digital infrastructure to improve the quality of connectivity and stimulate SMEs to take advantage of digital opportunities. The Ministry of High-Tech Industry has developed a new Digitalization Strategy, now under discussion with relevant stakeholders.

Moreover, specialized infrastructure for delivering IT-related training and R&D programmes is provided at several centres, including the Armenian-Indian Centre for Excellence in ICT (at Yerevan State University), which contains a high-performance computing facility; the Sun Microsystems Development and Testing Laboratory; the CISCO Systems Network Academy; the Artsakh Information Technologies Centre; and the Regional Mobile Applications Laboratory for ECA.

Other policy tools

The policy tools in place in Armenia do not sufficiently address present gaps of knowledge diffusion with regard to leveraging the potential of industrial technology assistance, public procurement for innovation or brokerage schemes for upgrading technology. Nevertheless, these tools provide indirect support in industrial technology assistance through ad hoc, donor-driven projects (see table IV.3) as well as support mechanisms provided by the Centre for Agribusiness and Rural Development, with the support of the Food and Agriculture Organization, to mitigate development gaps in the dairy industry, such as the use of outdated technology and processes.⁶

Sub-pillar IV IPO evaluation and recommendations

Achievements

- ✓ Start-ups and SMEs receive Information and brokerage services for technology upgrading from the ISC and various support programmes funded by international donors.
- ✓ The Government has successfully implemented digitalization projects in recent years, expanding broadband access and use across the country, and IT and high-performance computing centres are training highly skilled professionals in the ICT sector.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The policy tools directed at diffusing knowledge within the economy do not sufficiently address the issue of low innovation activity in the private sector. 	<ul style="list-style-type: none"> ✓ Stimulate innovation on the demand side by using public procurement to create a competitive advantage for innovative entrepreneurship while modernizing public services. 	Medium-term	Ministry of Finance
	<ul style="list-style-type: none"> ✓ Launch pilot procurement schemes in priority sectors and integrate procurement of innovative solutions in competitive funding schemes. 	Short-term	
	<ul style="list-style-type: none"> ✓ Adopt a pre-commercial procurement approach. 	Medium-term	
<ul style="list-style-type: none"> • Standards, testing and certification instruments in place do not sufficiently support SMEs in developing a systemic approach to incorporate new technologies and techniques into their business operations. 	<ul style="list-style-type: none"> ✓ Lead an awareness-raising campaign regarding ISO quality certification to enhance the competitiveness and growth of SMEs. 	Medium-term	National Institute of Standards ISC
<ul style="list-style-type: none"> • Support measures in place do not sufficiently address gaps in industrial technology assistance. 	<ul style="list-style-type: none"> ✓ Expand the innovation support services by introducing industrial technology assistance in the portfolio of infrastructure elements supporting innovation. 	Short-term	Ministry of Economy Other relevant ministries and authorities
	<ul style="list-style-type: none"> ✓ Introduce a co-financing mechanism to stimulate market-based service provision. 		

Source: UNECE.

Sub-pillar V: Research and education

Recognizing the requirements of today's labour markets and rapidly evolving technological environment, governments have pursued a multidisciplinary approach to education through STEM initiatives. Policy measures to enhance research are designed to promote research excellence, collaboration and commercialization.

Policies to increase the number of STEM graduates

Reforms are being introduced in all aspects of Armenia's education system (school management, teaching staff, educational programme, teaching and learning materials, and assessment tools), aiming at bridging the gap between educational outputs and labour-market needs. In addition, an edtech (education and learning technology) and modern teaching approach has been launched in a pilot region as part of the project "EU4Innovation in Armenia: Enhanced Education" focusing on STEM (2017–2020), funded with €26.1 million by the EU and the TUMO Foundation. The project is establishing an education centre for STEM students of HEIs to gain hands-on, practical experience in their fields. In 2020, the American University of Armenia and the United States Embassy launched STEM Education for Armenian Youth, a three-year programme of teacher training sessions and a student summer camp.

Policies to foster research development

The State Committee of Science channels approximately €25.4 million in funding to research in Armenia each year, representing 0.2 per cent of GDP. It bases the budget allocation on the priorities defined by the Development Programme of the Republic of Armenia's Scientific and Technical Field for 2015–2019 (EC, 2019).

The pool of researchers is shrinking. According to the Horizon 2020 Background Report, the number of researchers dropped by 12 per cent over 2010–2017 because of three factors: the ageing population, emigration and the low investment in R&D (EC, 2019).

The largest research institution in the country is the National Academy of Sciences, which comprises 34 research institutes across several scientific divisions (Mathematical and Technical Sciences, Physics and Astrophysics, Natural Sciences and Chemistry, and Earth Sciences). Scientific initiatives between 2014 and 2020 have included the launch of a Centre of Excellence of Applied Biology (in 2015) and a Laboratory of Molecular Genetics (in 2017) at Yerevan State University. An issue consistent with the sub-regional trend is the low level of involvement of researchers in the private sector (chapter V).

Armenia is well integrated into the international research community. Through continuous and close cooperation, over 400 projects have been funded by the International Scientific and Technical Centre since 1994. As of 2020, the State Committee of Science has eight active bilateral programmes – with Belarus, Bulgaria, France, Italy, and the Russian Federation. Armenian SMEs and scientific institutions have also been introduced to European research networks through participation in Horizon 2020, the EU funding scheme for innovation and research. As of 2019, the programme had implemented 25 joint projects (EC, 2019).

Sub-pillar V IPO evaluation and recommendations

Achievements

- ✓ Large-scale education reforms aim at building a modern education system that responds to labour-market needs.
- ✓ Cross-border research cooperation is maintained through joint collaborative projects and memberships in international research programmes.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Direct incentives for students to enrol in STEM-related fields are limited. 	<ul style="list-style-type: none"> ✓ Introduce a set of direct incentives for tertiary STEM education (such as excellence programmes, scholarships, and partial and full tuition fee coverage) to increase the number of students enrolling in STEM-related fields at HEIs. 	Medium-term	MoESCS MoHTI Other relevant ministries and authorities
	<ul style="list-style-type: none"> ✓ Draw on international cooperation in science and education to enhance STEM education through international knowledge transfer (for example, through STEM exchange programmes, conditional support for STEM degrees at foreign HEIs). 	Short-term	
<ul style="list-style-type: none"> • Limited financial and human resources constrain the stimulation of research in the public sector. 	<ul style="list-style-type: none"> ✓ Provide attractive professional opportunities to young scientists. 	Medium-term	MoESCS MoHTI Science Committee
	<ul style="list-style-type: none"> ✓ Introduce incentives at public research institutions to make research an attractive career choice, ensuring a balanced income system and diverse career options. 		

Source: UNECE.

Notes

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- ² Kolba, Public Sector Innovation Week 2018, 24 January 2018, <http://kolba.am/events/public-sector-innovation-week-2018>.
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- ⁴ Constantine, Laura L., Yes W.E. Can – Empowering Armenia’s women through a cycle of support, Armenian General Benevolent Union, 1 August 2018.
- ⁵ World Bank, Infographic – Gender Wage Gap in Armenia, 7 March 2019, <https://www.worldbank.org/en/news/infographic/2019/03/07/gender-wage-gap-in-armenia>.
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- Small and Medium Entrepreneurship Development National Centre: <https://smednc.am>
- UNDP Armenia. Women's economic empowerment in the South Caucasus: https://www.am.undp.org/content/armenia/en/home/projects/women_s-economic-empowerment-in-the-south-caucasus-
- Union of Manufacturers and Businessmen of Armenia: <http://umba.am/hy>
- Union of Advanced Technology Enterprises: <https://uate.org>

Chapter V

PILLAR III: INNOVATION POLICY PROCESSES

Pillar III examines the underlying processes for innovation policymaking: how data, evidence and stakeholder input inform how decisions are made, put into practice, monitored and evaluated. Ten detailed policy indicators address each step in the policy process, from problem identification or market failure to policy design, implementation, evaluation, impact assessment and learning.

In consultation with Armenia's Ministry of High-Tech Industry and the State Committee of Science, UNECE selected the Law on State Support for the Information Technology Sphere (IT Law) to assess under Pillar III, on the basis of these criteria:

- i) The policy measure is intended to foster science, technology and innovation (STI) in the country.*
- ii) The policy measure reflects the standard innovation policy practices in the country.*

Pillar III also looks at a specific innovation policy in depth, deriving broader policy lessons for innovation policymaking.

Innovation policy processes – strengths and weaknesses

Armenia has reformed its public administration system significantly in recent years, making important strides toward greater consistency with principles of democracy and free market relations. The strategic framework of public administration reform is unfinished, however, and the quality of the strategies is weak. Within the main line ministries in charge of innovation policy, the system for designing, developing and coordinating policy is still not fully functional. Gaps in the practices of planning and making policy affect their quality and hence the country's innovation performance.

Policies overall: progress and gaps

Government policies and interventions, including laws, play key roles in the development of the IT sector in economies, including those in transition. China, for example, under the Policies for Encouraging the Development of Software Industry and Integrated Circuit Industry framed by the State Council, recently applied a maximum tax rate of 10 per

cent for key software enterprises identified by the State instead of the normal rate of 30 per cent. Those that import capital equipment and technology (including software) are exempt from customs duties and VAT on imports. The degree of direct involvement varies across economies, with some governments adopting a facilitative approach and others opting for direct interventions. Among the latter are fiscal policies that offer financial concessions and benefits to players in the IT sector, like Armenia's IT Law. A study by the World Bank's InfoDev programme identified some success factors for designing and implementing fiscal policies to support the IT sector (box V.1).

Box V.1

Potential success factors in designing and implementing policies to support the IT sector

- Establishing the proper institutional mechanisms is integral to effective implementation. Most countries have attempted to achieve this by constituting nodal organizations within government that provide "single-window services" for beneficiary companies.
- Sound coordination between the departments and ministries administering the subsidies and incentives has been ensured through efficient e-governance systems.
- All successful countries have policy and regulatory regimes that encourage trade and investment linkages with other economies. Such linkages are usually facilitated through policy instruments that include liberal FDI guidelines, non-restrictive visa and work permit procedures, unrestricted trade in goods and services, and double-taxation avoidance agreements.
- In countries that encourage IT software development to put to use its low-cost, educated human resources, such as Armenia, the government needs to improve the legal system to protect and promote proprietary knowledge, as this is often a company's main business asset. As such, laws relating to intellectual property and the implementation of such laws are critical to gaining investor confidence.
- It is also critical that governments focus on providing such incentives not only to IT companies, but also to supporting sectors that provide, for example, physical infrastructure such as transportation, telecommunication and real estate players.
- Although in many countries, government institutions and organizations play a direct role in facilitating development of the sector in the initial stages, they have shifted to a facilitation role once the sector attains critical mass, with much of the subsequent growth initiatives led by the private sector.

Source: InfoDev (2018), pp. 53–70.

In November 2017, Armenia and the EU signed a new Comprehensive and Enhanced Partnership Agreement, identifying public administration as one of the key targets of domestic reforms. In April 2018, a Constitutional reform entered into force, transforming the political system from semi-presidential to fully parliamentary and requiring changes in laws regulating the organization and operation of State institutions (ECEAP, 2018; SIGMA and OECD, 2019).

Overall principles and rules in public administration have been formulated on the basis of criteria in EU member states. Established principles define key components of good governance, such as predictability and reliability, transparency, accountability and effectiveness, based on the rule of law. In addition, the new Law on the Civil Service meaningfully expanded the scope of the civil service (ECEAP, 2018; SIGMA and OECD, 2019).

Nevertheless, the public administration system does not yet fully comply with EU standards and relies heavily on support from international actors. The strategic framework

of public administration reform is unfinished, and the quality of the strategies is weak. Certain special groups of public servants and top-level positions are still excluded from the Law on Civil Service, and corruption is still widespread (ECEAP, 2018; SIGMA and OECD, 2019).

Policy focus: IT Law

Armenia's IT Law of 2014 aims to encourage the creation of start-ups and new jobs in the IT sector through tax benefits that are attractive but may have distortionary effects. In conjunction with related amendments to the tax legislation, the law defined tax privileges for newly established and start-up entities, including taxes of 0 per cent on profit and 10 per cent on income.

Concretely, the law pursues three objectives:

1. Raise competitiveness.
2. Involve skilled workers and continuously improve skills by providing competitive wages.
3. Implement research projects through grants and support for establishing start-ups.

Within the framework of the law, the following economic entities receive State support:

- Start-up business entities engaged in entrepreneurial activity in IT
- Economic entities engaged in implementing innovative and up-to-date IT
- Infrastructure that facilitates sector development, including techno-parks, techno-centres, incubators and accelerators
- Business entities implementing educational and research programmes in IT

The certification of beneficiaries is carried out by a commission established by the Government. Applications for issuance of a certificate are denied if the entity applying does not meet the requirements under this law. To ensure a unified approach and reduce the risk of tax evasion, benefits are available until 31 December 2022.

The law has been operationalized successfully, and uptake of the law's benefits has been significant. But its preparation was not fully evidence-based and the monitoring of impacts is incomplete, with both processes ignoring the potentially distorting effects of the benefits offered under the law.

Table V.1 Overview of sub-pillars and indicators for innovation policy processes

Sub-pillar I: Preparation	Sub-pillar II: Design	Sub-pillar III: Implementation	Sub-pillar IV: Post-implementation
Innovation foresight	Planning	Amendment of policies	Ex-post evaluation
Rationale	Decision-making	Review of the policy against its action plan	Adaptation
	Private sector consultation		
	Coherence		

Source: UNECE.

Sub-pillar I: Preparation

Sound preparation of policies sets the foundation for the policymaking process. Public intervention should depend on the identification of market failures as well as future trends that will affect the area of intervention.

Innovation foresight

Innovation foresight – the practice of capturing future trends and perspectives for research activities that are subsequently incorporated or adjusted in innovation policies – is not yet integrated into the Armenian process of making innovation policy or other policies in a systematic and continuous manner. It does take place but tends to be ad hoc, tied to specific policy design efforts – such as the Development Strategy 2030 – and not subject to continuous revision. This state of affairs means that policies such as the IT Law may not be grounded in agreed, realistic assumptions from which key performance indicators follow in some fashion, and that it is not possible to monitor and evaluate impacts in a concerted fashion.

Policy rationale

No market failure analysis was conducted by the former Ministry of Economic Development and Investment, the institution responsible for drafting the IT Law; instead, the rationale was to implement the Government’s strategic vision of supporting small companies and start-ups engaged in developing products by reducing their tax burden. The law also aimed to make the tax system “competitive” in the sub-region for IT companies. In addition, the Government expected that this tax incentive would reduce the number of businesses (individuals or groups of specialists) operating without a State registration.

The main analytical document underpinning the preparation of the IT Law was a benchmarking analysis of relevant tax rates in 18 countries of Central and Eastern Europe, and the Caucasus. It provides information on the rates of the main tax types (VAT, profits and income), as well as incentives related to R&D, workforce development and free or special economic zones. The summary of the benchmarking analysis was circulated among key stakeholders with the draft of the law.

Not conducting a comprehensive market failure analysis when the IT Law was conceived was a questionable approach, given that subsidies are efficient only when they correct an identified market failure, bringing social and private costs and benefits into alignment (WTO, 2006). Inefficient subsidies can be extremely expensive for governments: by directing resources away from other legitimate priorities they ultimately reduce the fiscal health of the government and undermine investment decisions, distorting competition and reducing the pressure on businesses to become more efficient.

During its preparation the law underwent regulatory impact assessment (RIA), including for SME impact, competition and the business environment. At that time all laws required an RIA, but RIA practices were rudimentary. They were conducted as formalities, without substantial analysis or use of quantitative and qualitative assessment tools.

Broader policy issues

Since 2014, the Government has introduced a number of governance and public administration reforms, but the quality of policy and legal planning remains limited. Such planning lacks properly defined policy objectives, outcome-level indicators and detailed cost estimates. In particular, insufficient attention is dedicated to ensuring that policies are affordable (SIGMA and OECD, 2019). The legal framework for preparing policy is in place, but in practice policymakers do not fully comply with the requirements and standards for evidence-based policymaking. Regulation of the conduct of impact assessments is in a transitional phase. The quality of RIAs remains low across the main ministries in charge of designing innovation policy (SIGMA and OECD, 2019). For instance, the law on legislative drafting adopted in 2018 entailed changes in the approach to developing RIAs. A centralized impact assessment has replaced the decentralized approach, where line ministries assessed the impacts of legislation. Yet, the detailed rules of that centralized assessment have not been adopted, so evidence-based substantiation of legislation is also in transition (SIGMA and OECD, 2019).

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ The legal framework for preparing policy is in place.
- ✓ The Government has adopted a new law on drafting legislation.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Innovation foresight is not yet integrated systematically and continuously into policymaking. Foresight tends to be ad hoc and tied to specific policy design efforts. Individual measures may not be grounded in agreed, realistic assumptions from which KPIs follow, and it is not possible to monitor and evaluate impacts in a concerted fashion. 	<ul style="list-style-type: none"> ✓ Integrate innovation foresight practices into the policy processes of relevant line ministries, to capture future trends in and perspectives on research activities for incorporation in the long-term strategic direction of innovation development. 	Medium-term	Ministry of Economy MoESCS Ministry of High-Tech Industry
<ul style="list-style-type: none"> • Evidence-based policymaking is not yet fully established, and the quality of the analysis supporting new policies and laws is low. 	<ul style="list-style-type: none"> ✓ Build on efforts and experiences with RIAs by implementing the timeline and plan to institutionalize them, to ensure that drafters use evidence-based policymaking systematically when creating policies and laws, particularly those that create subsidies. ✓ Ensure continuous development of the capacity of line ministries to conduct broad and comprehensive RIAs, as well as to create high-quality legal drafts (SIGMA and OECD, 2019). 	Medium-term	National Centre for Legislative Regulation Office of Government

Source: UNECE.

Sub-pillar II: Design

Public-private consultations are an integral part of the policy design process, to ensure policy relevance to the market and private sector needs and to confirm the commitment of relevant stakeholders to its implementation. Innovation policy is a supplementary component of a country's overarching strategy that contributes to the achievement of the broader vision and objectives of socioeconomic development. Its priorities and activities should be consistent and coherent with relevant "non-innovation" policies.

Planning

During the preparation of the IT Law, Armenia had no active innovation strategy to align the law with. The concept of IT sector development, approved by the Government in 2008, was in force, yet no reference to this document appears in the text of the law or in the justification for it. More generally, central planning documents are not fully aligned with each other, and reports on the implementation of central planning documents are not broadly available for public inspection (SIGMA and OECD, 2019).

Public-private consultation

The evidence points towards broad and open consultations during the design of the IT Law. This is typical for policy design practices in Armenia, which are generally quite open, relative to most of its peers in the sub-region. The Ministry of Economic Development and Investment, which coordinated the design of the law, conducted a broad consultative process by engaging stakeholders from the private sector, non-governmental organizations and civil society, and – importantly – the SME and IT communities. During UNECE field missions throughout 2019, the EIF, various SME associations, the Union of Advanced Technology Enterprises and the Business Support Office all confirmed that they participated actively in these consultation processes. Although the process was open, stakeholders voiced criticism about the lack of mechanisms to effectively ensure that their views were taken on board and integrated into the legislative draft: concerns about adopting a law that subsidizes a group of companies without a comprehensive market failure analysis were reflected by a range of stakeholders.

The draft IT Law was circulated among relevant state bodies for their agreement until it was adopted by the Government, following the Government rules that before submission to the Government all legal acts be sent to relevant government bodies to obtain their consent. For this particular law, the consent of the Ministry of Finance, the Ministry of High-Tech Industry, and the Ministry of Justice was mandatory and was obtained after well-structured consultations.

Broader policy issues

Public scrutiny of government work and participation in policy design, including across ministries responsible for STI policymaking, are more open in Armenia than in its peers in

the EESC sub-region. Legislation is available online and free of charge; however, the central registry of regulation is not updated systematically (SIGMA and OECD, 2019).

According to the Rules of the Government, the rationale for adopting a policy must be published online during the policy design phase, with the policy draft (SIGMA and OECD, 2019). The results of public discussions must be reported to the Government in a summary note describing the comments received and how they were included in the draft. If comments were not included, the reasons for not accepting them need to be stated. The results must also be published online with the amended version of the draft act within 15 days of the end of the consultations (SIGMA and OECD, 2019, p. 43).

In accordance with the 2018 Law on Legal Drafting, the Government developed and adopted new rules of public consultation. They prescribe mandatory consultations at the end of the policy development process, after drafts have been written – which is late in the process – and do not make general advance notice of consultations obligatory (SIGMA and OECD, 2019). Ministries apply these rules inconsistently.

Policy coherence

According to the government rules, interministerial consultations are required to last for five working days, other than those with the Ministry of Justice, which gets 15 working days for review by State legal experts (SIGMA and OECD, 2019). The ministries of Finance and Justice must always be consulted, in addition to all institutions affected by the policy. In practice, interministerial consultations are carried out consistently and adhere to the required deadlines (SIGMA and OECD, 2019). Mechanisms exist for resolving conflicts during interministerial consultations is continuously developed (SIGMA and OECD, 2019) – a positive and unique development in the sub-region.

Procedures for developing policy *within* ministries in charge of STI policymaking are not clearly defined and regulated. Policy drafts are shared between departments on an ad hoc basis only when considered necessary. Existing procedures and rules therefore do not ensure that all relevant departments within ministries are consulted consistently and involved in developing policy proposals. The lack of intraministerial consultation is likely to lead to missed opportunities for synergies between departments.

The analysis found no evidence of systematic training efforts on drafting policy for civil servants in ministries responsible for STI policies.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ Broad and open consultations took place during the design of the IT Law.
- ✓ Well-structured interministerial consultation occurred during the design of the IT Law.
- ✓ Government rules about public consultations during the policy design process are clear and sensible.
- ✓ Interministerial consultations are carried out consistently across ministries in charge of STI policymaking and generally meet the required deadline.
- ✓ Mechanisms exist for resolving conflict during interministerial consultations.

Sub-pillar II IPO evaluation and recommendations (Concluded)

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> There is a lack of coherence between laws and sector strategies and central planning documents. 	<ul style="list-style-type: none"> ✓ Consider building coherence mechanisms into the legislative design process, that ensure that laws and sector strategies are aligned with overarching, central planning documents. 	Medium-term	Office of the Prime Minister
<ul style="list-style-type: none"> The central registry of regulation is not kept fully up to date. 	<ul style="list-style-type: none"> ✓ Keep the central registry of legislation updated (SIGMA and OECD, 2019). 	Short-term	MoJ
<ul style="list-style-type: none"> Ministries are inconsistent in abiding by the government rules on public consultations. 	<ul style="list-style-type: none"> ✓ Certify the that the capacity of ministries to conduct meaningful and effective public consultations is continuously developed (SIGMA and OECD, 2019). 	Medium-term	Office of the Prime Minister
<ul style="list-style-type: none"> Procedures are not yet established for developing policy within ministries in charge of STI policymaking. 	<ul style="list-style-type: none"> ✓ Establish mechanisms to ensure that relevant departments within ministries are consulted during the policy design process. 	Medium-term	Office of the Prime Minister

Source: UNECE.

Sub-pillar III: Implementation

Targets and time frames defined in the action plan provide a basis for regular reviews of implementation progress. Analysis of intermediate progress helps identify administrative, institutional and technical challenges faced during implementation and makes it possible to undertake necessary measures, including adjusting activity and reallocating resources.

Amendments of policies

Two amendments to the IT Law were passed in 2017 and 2019. The major change in 2017 was expanding the eligibility criteria to allow company branches to apply for tax privileges and defining the five-year period for the privileges. The 2019 revision extended the deadline until 31 December 2022. Each revision refined the eligibility criteria and activity fields of eligible companies.

Review of the policy against its action plan

The IPO analysis found that the operational part of the IT Law has been commendable: its content and privileges were widely and diversely promoted, application details were structured with comprehensive and clearly drafted guidelines and the application process was managed by a dedicated commission. Uptake of the of the incentives in the law and registrations of new businesses since 2014 have been impressive. Interviews with start-ups confirmed that one of the most important benefits for success was the tax reduction on the equity financing they received from investors. Indeed, many of the start-ups would not have been able to survive had their investment been taxed at the full rate.

Broader policy issues

In addition to the IT Law, the Armenian Government has deepened previous efforts in complementary areas, including foreign trade, investor protection and property registration (EIF, 2015). As mentioned earlier, it is important to couple incentives for IT companies with trade and investment incentives and to develop support sectors in parallel, such as property development. The Government has also been implementing the Programme of Activities in Support of Improved Business Environment, which aims to facilitate and streamline the administrative procedures required for starting and developing a business (EIF, 2015).

Sub-pillar III

IPO evaluation and recommendations

Achievements

- ✓ Implementation of the IT Law is advanced and on track with the action plan.
- ✓ The operational part of the IT Law has been positive.
 - ✓ Adjustments to the law have been sensible.
- ✓ The Government has implemented legal measures that are complementary to the IT Law.

Source: UNECE.

Sub-pillar IV: Post-implementation

Ex-post evaluation is completed after the implementation of the action plan and based on results rather than forecasts. It helps establish the impact of policy activities on the industry in general, on specific fields or on beneficiaries. In light of experience acquired during implementation, governments then introduce necessary adjustments to innovation policy measures so as to better target new or established policy objectives.

Ex-post evaluation

The IT Law is still being implemented, so this sub-pillar can be assessed only in part. For the revision of the law and the extension of the tax incentives period, the Ministry of High-Tech Industry evaluated the impact and results on the basis of information it collected by monitoring beneficiary companies. It appears that the evaluation report examined the impact of the tax incentives, based on a relatively simple results assessment, using data on turnover, employment and exports from beneficiary companies. The IPO analysis found that the ministry did not collect evidence from a comparable group of non-beneficiary firms or conduct any other form of evaluation to verify the potential distorting effects of the subsidies offered to IT companies. The analysis also found no evidence of an exit strategy.

Broader policy issues

Overall, monitoring and evaluation in the Government is still insufficient and overly focused on outputs, with few systemic linkages to ensure that learning feeds into the policy design process, including in government bodies responsible for STI policy. Limited evidence was found of any type of impact assessment of innovation policies across relevant ministries. For details on the lack of monitoring and evaluation of innovation policies and measures, see chapter IV.

Sub-pillar IV IPO evaluation and recommendations			
Achievements			
✓ An impact evaluation of the IT Law was conducted.			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The evaluation of the IT Law was limited. 	<ul style="list-style-type: none"> ✓ Collect data from a comparable group of non-beneficiary firms, and conduct an evaluation to verify the potential distorting effects of the subsidies offered to IT companies. 	Short-term	Ministry of High-Tech Industry
<ul style="list-style-type: none"> Monitoring and evaluation is insufficient and overly focused on outputs, with few systemic linkages to ensure that learning feeds into policy design. 	<ul style="list-style-type: none"> ✓ Implement RIAs systematically to enhance the quality of the flow and stock of laws and policies, especially in light of the scarcity of monitoring, evaluation and impact assessment in the policymaking process. 	Medium-term	Line ministries
<ul style="list-style-type: none"> Monitoring and evaluation have only a tenuous link with policy design. 	<ul style="list-style-type: none"> ✓ Establish a more systemic linkage of monitoring and evaluation to policy design, including in government bodies responsible for STI policy. 	Medium-term	Line ministries and implementation agencies

Source: UNECE.

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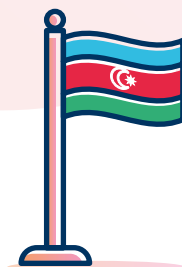
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AZERBAIJAN



Chapter I

ECONOMIC OVERVIEW

General overview

Azerbaijan is an upper-middle-income country in the South Caucasus, at the crossroads connecting Europe to Central and East Asia and the Islamic Republic of Iran. It is a global pioneer in hydrocarbons, and its exports from the massive reserves in the Caspian Sea remain the main driver of the economy, contributing to a well-endowed sovereign wealth fund. The overreliance on fuel exports has left the economy undiversified and vulnerable to global commodity price shocks, a risk compounded by low productivity in non-oil sectors and growing environmental concerns.

Reform process

Since the dissolution of the Soviet Union in 1991, the economy of Azerbaijan has undergone a series of reforms, including financial liberalization, the restructuring of the banking sector and the establishment of a State Oil Fund in 1999. Pipeline infrastructure projects and foreign investment inflows fuelled the development of the oil sector. Further structural changes began in the 2000s, reforming the public sector in education, health and public administration, followed in the 2010s by programmes for socioeconomic development and economic diversification. Today, reforms continue to be made to improve the business environment, as reflected in the country's rank (34/190) in the World Bank's 2020 *Doing Business* report. Several aspects, however, such as the protection of minority investors (105th), show weaker performance, reflecting a key impediment to private sector development, investment and innovation.

GDP growth

Following a severe decline in the first five years of independence, average GDP growth in Azerbaijan has been strong since 1995. It reached its highest rate in 2006 (34.6 per cent), when the Baku–Tbilisi–Ceyhan main export pipeline was completed, coinciding with an increase in global oil prices (figure I.1). The economy's overreliance on oil exports has led to both volatility and stagnation in GDP growth, and makes Azerbaijan particularly vulnerable to external shocks, such as the sharp decline in commodity prices in 2014–2015 and the global financial crisis in 2008–2009. In 2019, GDP growth was at 2.2 per cent, below the sub-regional average (3.8 per cent), and it was expected to drop to 0.5 per cent in 2020 because of oil price shocks (such as the COVID-19 pandemic),

the inflexibility of Russian oil supply, geopolitical tensions and surplus investment into capacity when oil prices were high (ADB, 2020).

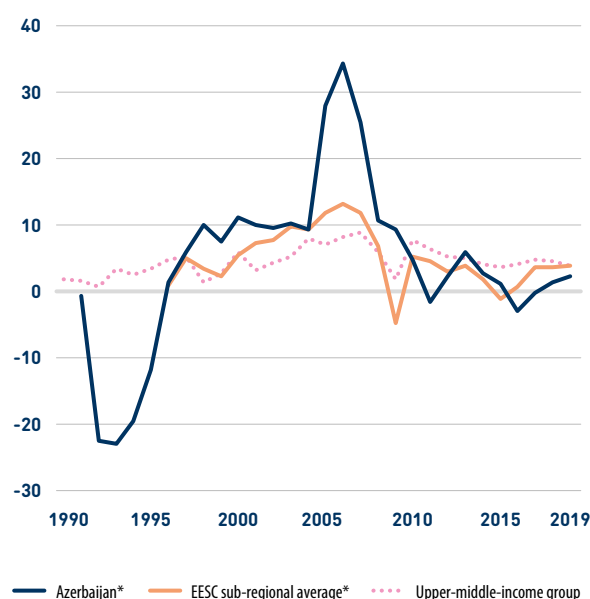
Despite the growth in GDP driven by stable oil production and the rise in private consumption, the need to increase productivity across all sectors has become increasingly pronounced. Gross capital formation, reaching almost 28 per cent in 2015, declined to 20 per cent in 2019. In addition, personal remittances accounted for 2.6 per cent of GDP in 2018, higher than the average in the upper-middle-income group (0.7 per cent) but significantly lower than the average in the Eastern Europe and the South Caucasus (EESC) sub-region (9.3 per cent).

Government spending, which was above 30 per cent between 2011 and 2015, declined to 25 per cent in 2017 and then recovered to almost 29 per cent in 2018. Through public spending, wealth from the oil sector was transferred to other sectors, which not only increased the dependence of the private sector on public investment, exposing private sector output to fluctuations in oil prices and fiscal policy changes and but also had limited effects on sustainable growth in productivity (Kintsurashvili and Kresic, 2019). The current account surplus reached almost 12 per cent in 2018 but declined to under 10 per cent in 2019 (World Bank, 2020c). Furthermore, the economic impact of the COVID-19 crisis, such as the decline in demand for commodities and in oil prices, is expected to have a negative effect on foreign direct investment (FDI) in the country (UNCTAD, 2020).

Foreign direct investment

FDI inflows to Azerbaijan increased from 3.5 per cent in 2013 to almost 12 per cent in 2016 (the highest in the sub-region) but – suppressed by low global oil prices – declined to 3 per cent of GDP in 2019, the third highest after the Republic of Moldova (5 per cent) and Georgia (7.2 per cent) (World Bank, 2020c). Although most FDI concentrates in the oil and gas industry, the country has made efforts to diversify the economy in recent years, primarily in agriculture and tourism (Heritage Foundation, 2020b). According to the 2018 Business Climate Survey of the EU, with respondents primarily from the services sector, non-extractive FDI from the EU is primarily market-seeking (33 per cent). This shows that foreign investors prefer to sell in Azerbaijan (EU4Business, 2018) and channel little investment into diversified production.

Figure I.1 • Annual GDP growth, 1990–2019 (Per cent)



Source: UNECE, based on data from World Bank (2020c).

*Missing values for the Republic of Moldova (1990–1995), and Armenia, Belarus and Azerbaijan (1990).

Sectoral decomposition

Although oil production peaked in 2019, its average rate of absolute production, measured in barrels produced, declined by 25 per cent over the past six years, underscoring the need to diversify into non-energy sectors (World Bank, 2019; 2020b). The extractive industry remains dominant, accounting for 42 per cent of GDP in 2018 (Azstat, 2020) despite recent marked growth in both services and agriculture. In 2019, 49.3 per cent of the labour force (modelled ILO estimate) was employed in services (with a value added of 35.2 per cent of GDP), 35.9 per cent in agriculture (5.7 per cent of GDP) and 14.9 per cent in industry (48.7 per cent of GDP), confirming that non-oil sectors have low productivity and that unskilled labour has few alternatives. Exchange rate risk resulting from volatile oil prices, compounded by the hard peg to the US dollar, has put pressure on the banking sector, where State-owned banks predominate.

Demographics

Azerbaijan had the highest rate of population growth among the EESC countries at 0.8 per cent in 2019, although it has decreased steadily (from 1.3 per cent in 2012) (World Bank, 2020c). According to five-year estimates of the World Bank (2019b), annual net migration during 2003–2007 was 53,000 but decreased rapidly to 6,000 during 2013–2017. The unemployment rate in 2019 was 5.5 per cent, with a stable employment-to-population ratio (61–63 per cent; modelled ILO estimate) during 2014–2019 (World Bank, 2020c). Furthermore, in 2000 the shares of rural and urban populations were approximately equal; in 2019, however, 56 per cent of Azerbaijanis lived in urban areas (World Bank, 2020c).

External position

Despite its high trade volumes, Azerbaijan is among the few countries that is not a member of the World Trade Organization (WTO), which constrains exports to WTO member countries. Trade with the EU is based on the Partnership and Cooperation Agreement (1999); negotiations for a new agreement began in 2007 (EC, 2020). Moreover, in 2018 Azerbaijan exported primarily to Europe and the Middle East, in particular to Italy (30.2 per cent), Turkey (9.4 per cent) and Israel (6.74 per cent). The Russian Federation and China are the leading sources of imports, accounting for 16.4 per cent and 10.4 per cent of the total in 2018 (World Bank, 2020d). Azerbaijan's total value of trade accounted for 92 per cent of GDP in 2018, with exports – mainly fuel – standing at 54.3 per cent (World Bank 2019a).

Azerbaijani exports are highly reliant on the resource sector (Kintsurashvili and Kresic, 2019). According to the index of merchandise export concentration, where values closer to zero indicate higher diversification and values closer to one signify higher concentration, the country's exports (0.83) are highly concentrated and significantly above the average for the EESC sub-region (0.3) (UNCTADstat, 2020a). More specifically, in 2018, 80.7 per cent of the country's exports consisted of crude petroleum, 7.64 per cent of

Box I.1 Southern Gas Corridor

The Southern Gas Corridor links three gas pipelines, the Southern Caucasus Pipeline (SCPX), the Trans Anatolian Pipeline (TANAP) and the Trans Adriatic Pipeline (TAP). Originating in Azerbaijan, it runs 3,500 km across Georgia, Turkey, Greece and Albania to southern Italy. With over 90 per cent of the construction complete, Azerbaijan expects to supply Europe with gas from its Shah Deniz gas field in the Caspian Sea by the end of 2020. By concluding long-term contracts with European states, the Government aims to secure demand for the country's gas exports, reducing the impact of external shocks to the economy.

Source: Kazimbeyli, Yaver (2020). Southern Gas Corridor to be fully operational by year's end, Caspian News, 17 February, <https://caspiannews.com/news-detail/southern-gas-corridor-to-be-fully-operational-by-years-end-2020-2-17-10>.

petroleum gas and 2.63 per cent of refined petroleum (OEC, 2020). Similarly, Azerbaijan has the most revealed comparative advantages (RCAs)¹ in mineral fuels, lubricants and related materials (one-digit group), within which petroleum oils (three-digit group) has an RCA value over 10 (UNCTADstat, 2020b). Growth relies heavily on fuel exports (92 per cent of merchandise exports in 2018), which increases the economy's vulnerability to external shocks (Ibadoghlu, 2018) (box I.1). Private and non-energy, tradable sectors need to be strengthened, especially to combat potentially sustained low oil prices (ADB, 2020).

The 2020 Competitive Industrial Performance (CIP) Index ranks Azerbaijan at 120/152, the lowest rank in the EESC countries after the Republic of Moldova (111/152) (UNIDO, 2020). The Global Competitiveness Report ranked the country 58/141 in 2019, the highest in the sub-region and an improvement from the 2018 rank of 69/141; strengths were noted in the dimensions for the labour market (21/141), the product market (23/141) and business dynamism (23/141) (WEF, 2019).

Institutional quality

Credit regulation and e-government services have fostered the development of both the public and private sectors. As a result of continuous reforms, institutions in Azerbaijan have become stronger over the past decade, yet room for improvement remains in several niches. Specifically, on institutional quality assessed as an average of the World Governance Indicators (Kaufmann and Kraay, 2020) of control of corruption, government effectiveness, rule of law, and voice and accountability, Azerbaijan scored –0.8, lower than the sub-regional average of –0.3. The Government should therefore aim to enhance judicial effectiveness, link economic and political strategies, and increase institutional transparency (Heritage Foundation, 2020b).

Sustainable development

Efforts to reduce poverty, achieve gender equality and address environmental concerns have seen progress over the past decade, but challenges remain. Azerbaijan has reduced

poverty by increasing social spending, with 5.1 per cent of the population at the national poverty line in 2018 as compared with 9.1 per cent in 2010. Yet income inequality is a growing concern, as is the ability to invest in employment outside of the oil industry and the public sector. GDP is concentrated strongly in the city of Baku (68 per cent of the economy in 2019) with less than 10 per cent in each of the other regions, revealing a rural-urban divide greater than the sub-regional trend.

The rate of female labour force participation is one of the highest in the sub-region (63.4 per cent in 2019), and their enrolment rate in tertiary education increased from 19 per cent in 2009 to almost 30 per cent in 2018, higher than that of men (26 per cent). Yet challenges remain on the path towards gender equality. Among other issues, the unemployment rate of women (approximately 6 per cent) has consistently been higher than that of men (approximately 4 per cent) (World Bank, 2020c). This is compounded by a significant wage gap in some types of economic activity, such as mining (47.6 per cent in 2018) and professional, scientific and technical activities (65.5 per cent in 2018) (Azstat, 2019) (chapter IV). More equality in recruitment processes across sectors would enable the country to exploit the full potential of its female human capital.

Achieving sustainable development also requires addressing environmental concerns. Although Azerbaijan ranked 44/129 on GDP per unit of energy use in the 2019 GII, land degradation, clean water shortages and pollution are among the most pressing issues resulting from oil production and industrial activities. In 2018, the economy generated its highest amounts of waste from manufacturing (765,400 tons) and mining (204,800 tons). Excessive greenhouse gas emissions have been reported in some industries, including forestry (50.7 million tons of CO₂ equivalent) and energy (37.9 million tons of CO₂ equivalent) (Azstat, 2020). Lack of private investment in the renewable energy sector, because of the insufficient policies and regulatory frameworks, impedes the country's sustainable use of its natural resources (Kintsurashvili and Kresic, 2019).

Synthesis

The table here presents the main achievements and challenges for the economic development of Azerbaijan, based on the findings in this chapter.

Progress made so far

- Leveraged the country's strategic position and significant hydrocarbon reserves to boost exports to Europe
- Maintained strong average FDI inflows and macroeconomic stability
- Improved institutional quality and regulatory performance
- Reduced absolute poverty and raised national incomes

Challenges ahead

- Further diversify exports to take advantage of trade opportunities in products and services.
- Strengthen private and non-energy sectors to build resilience.
- Reduce overdependence on oil production, managing its volatility.
- Enable business sector growth and development, and address remaining governance issues.
- Address challenges for sustainable development, especially reducing harmful.

Source: UNECE.

Note

- ¹ The revealed competitive advantage (RCA), developed by UNCTADstat, measures trade patterns between countries based on their relative productivity. It does not take into account national trade measures, such as subsidies and (non-)tariff regulations.

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Chapter II

INNOVATION PERFORMANCE OVERVIEW

Innovation climate

Economic growth in Azerbaijan depends largely on production and export of hydrocarbons, and the overall focus on low value added activities. Despite the construction of high-technology parks, commercialization efforts at higher-education institutions (HEIs) remain ineffective, impeding productivity in the labour market. To fully exploit its innovation potential, Azerbaijan needs to diversify its economy by increasing support for small and medium enterprises (SMEs) in the non-oil sector and foster innovative activities by supporting investment in research and development (R&D) activities in the private sector and by improving access to finance for SMEs.

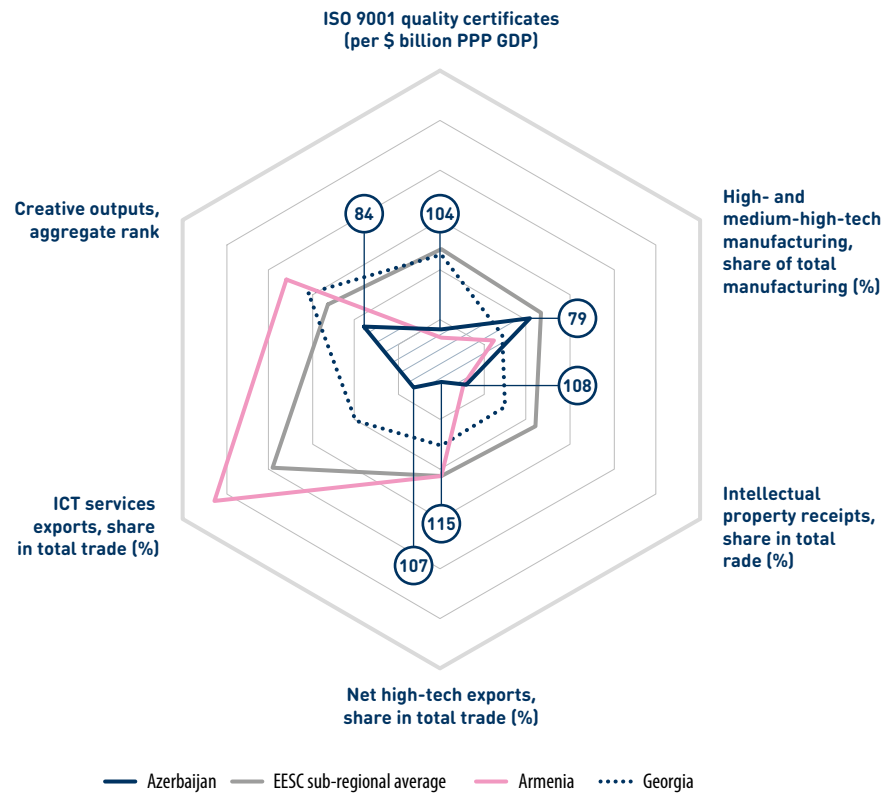
Innovation outcomes

The 2019 Global Innovation Index (GII) ranked Azerbaijan 84th out of 129 economies, two positions down from 2018 (Cornell University, INSEAD and WIPO, 2019). Despite recent efforts to improve institutional quality and the business environment, the country still faces challenges in translating innovation inputs into outputs. Figure II.1 on the following page depicts innovation performance on selected output indicators, as ranked in the 2019 GII.

Innovation outputs in Azerbaijan are generally lower than the sub-regional averages, and on most separate indicators the country is outperformed by its neighbours. Its best relative performance is in the share of high-tech and medium-high-tech manufacturing in total manufacturing (approximately 10 per cent in 2019), where it ranked 79th, ahead of Georgia (91st). Yet Azerbaijan's high-tech net exports were the lowest in the sub-region, at 0.1 per cent of total trade (imports and exports), ranking the country 115th and highlighting the risks that the undiversified and oil-dependent export basket hides for innovative development (chapter I). Upgrading technology can help the private sector develop and the economy move up in global value chains; however, the number of ISO quality certificates (1.2 per \$1 billion PPP GDP in 2019) is particularly low, ranking the country 105th and indicating limited absorptive capacity in the private sector.

According to the 2019 GII, a competitive advantage for Azerbaijan is the development of non-technological innovation, which remains predominantly low (or unreported) across the sub-region. The country scores high in both information and communication technology (ICT) and organizational model creation (35th) and in ICT and business model

Figure II.1 • Innovation performance by selected GII indicators, 2019 ranks



Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).
Note: Lower values indicate stronger performance.

creation (48th), revealing an income group strength in creative outputs. This is an evident improvement since 2016, when the country's Strategic Road Map for Development of Telecommunications and Information Technologies highlighted a weakness in this area, namely the preferences of SME employers for traditional business practices because of the lack of technological skills and awareness of employees.

No nationwide survey has investigated the innovation activity of firms, so information on the needs of the private sector in relation to innovation is limited. According to the Business Environment and Enterprise Performance Survey (BEEPS V) of the European Bank for Reconstruction and Development (EBRD), innovation activity in Azerbaijan is extremely low: 99 per cent of SMEs reported no innovation between 2010 and 2012. One of the most significant obstacles was access to finance, as compared with the country's EESC peers (OECD et al., 2020). To correctly characterize the country's innovation performance and to design effective innovation policy, the Government needs to collect comprehensive data on the innovation activity of firms.

Over the past several years, as the Government has made digitalization of public services central to its agenda (Azerbaijan, 2017), the ICT sector has developed; yet ICT use in businesses is generally low, in particular among SMEs (ADB, 2019). According to the

State Statistical Committee (Azstat) (2020), only 14 per cent of domestic firms owned a website in 2017, largely because of the high costs of registering domains. In the 2019 GII, Azerbaijan ranked 64th in ICT access and 63rd in ICT use, the former a slight improvement from 2015 (from 65th) and the latter a substantial decline (from 49th). The number of fixed broadband subscriptions was about 19 per 100 people, a slight increase from 2017 to 2018, just below the peak of almost 20 in 2014. This was higher than in Armenia (11.8), Ukraine (12.8) and the Republic of Moldova (15.4), but lower than in Belarus (33.9) and Georgia (21). Despite ongoing efforts to diversify the economy, the ICT sector in 2019 accounted for a low share of value added – 2.2 per cent of GDP in 2019 (3.4 per cent excluding the oil sector) (ADB, 2019; Azstat, 2020). Furthermore, ICT exports as a share of total trade were barely 0.4 per cent, ranking the country 107th.

Innovation activity – channels, strengths and weaknesses

Cross-border knowledge absorption, through both increasing the capacities of domestic firms to innovate and adopting knowledge and technology from abroad, is integral for developing an innovation system. The latter is particularly important as it can help Azerbaijan diversify without entirely transforming its production structure. Indeed, in 2017 imports of computer and information services already exceeded exports by more than \$40 million (WTO, 2020).

International knowledge transfer

Although foreign investment is high (chapter I), the majority flows into the oil and gas sector. Specifically, net inflows in 2019 constituted an impressive 8.8 per cent of GDP, ranking Azerbaijan 15th. Nonetheless, gross expenditure on R&D from abroad was about 0.1 per cent that year, and high-technology imports were only 2.8 per cent of GDP (ranking the country 124th). Furthermore, the country ranks 113th on the aggregate GII score for knowledge absorption.

In the 2019 Global Competitiveness Index (GCI), Azerbaijan performed well in terms of business dynamism (23/133), specifically due to high scores on the cost of starting a business (1.3 per cent of gross national income per capita) and the average time needed to start a business (3.5 days) (WEF, 2019). Yet its significant dependence on capital-intensive oil extraction, which entails limited use of technology, means that more productive, high-growth SMEs are scarce. In 2016, large firms employed more than 80 per cent of the labour force, and SMEs (125 employees or fewer) accounted for less than 10 per cent of value added in GDP (Azstat, 2019). Moreover, more than 50 per cent of SMEs concentrated in trade and in repair of motor vehicles, while less than 1 per cent were active in ICT (2016). This economic structure underscores the need for the private sector to diversify, specifically in support of SMEs (OECD, 2019).

Investment in R&D

Neither the public nor the private sector invests much in R&D. The Government conducts 86 per cent of R&D activity. HEIs, which conduct only 9 per cent, are hampered by the

lack of regulatory support and limited investment, and thus do not effectively translate innovation inputs into competitive innovative outputs (World Bank, 2018).¹ In the 2019 GII, on funding from abroad Azerbaijan ranked 100th, behind all its neighbours, with a value of 0.1 per cent of gross expenditure on R&D – significantly lower than that of Armenia (1.7 per cent) and the Republic of Moldova (3.7 per cent), but more significantly lower than that of Belarus (14.1 per cent), Georgia (14.7 per cent) and Ukraine (24.4 per cent).

Gross expenditure on R&D was only 0.22 per cent of GDP in 2015 and dropped to 0.19 per cent in 2019, the lowest share among the EESC countries (World Bank, 2020). It was largely spent on salaries (70 per cent) (World Bank, 2018). Almost 28,000 employees were engaged in R&D in 2018, but only about 40 per cent had a doctoral degree. SMEs spent about AZR 30 million on R&D in 2018, the majority of it in the industry and construction sector; expenditure on innovation was highest in trade and in the repair of transport means, followed by industry (excluding construction) (Azstat, 2020).

According to the BEEPS V responses, only about 1 per cent of Azerbaijani enterprises had invested resources in R&D and only 2 per cent had actually introduced innovations (EBRD, 2019). The Azerbaijan National Academy of Sciences (ANAS), one of the main institutions responsible for research (World Bank, 2018), focuses its scientific activity on nuclear and renewable energies. Furthermore, although the 2019 GII indicates a high degree of collaboration between industry and universities in Azerbaijan (ranked 32nd), such collaboration seems insufficiently diversified across the private sector (ADB, 2019); instead, collaboration focuses on research activities in the energy sector. This creates a significant impediment to developing innovation.

Skills development

Aligning education with business needs is a pressing concern. According to the Strategic Road Map for Development of Telecommunications and Information Technologies (2016), most SME employees have limited technology skills and awareness, and domestic corporations consider the quality of the IT talent to be poor, especially in software development. In 2017, government expenditure on education was quite low at 2.5 per cent of GDP, a decline from 2016 (2.9 per cent) and the lowest in the EESC sub-region (World Bank, 2020). In 2018 enrolment in tertiary education as a share of the total eligible population was the lowest in the sub-region at 27.7 per cent – significantly less than in Georgia (60.3 per cent) and Belarus (87.4 per cent) (World Bank, 2020). Nevertheless, Baku State University is listed in the Quacquarelli Symonds university ranking as among the best HEIs worldwide.

The 2019 GII found that only 23.2 per cent of the workforce was employed in knowledge-intensive jobs, also the lowest share in the EESC sub-region (the average was about 30 per cent). The lack of advanced skills creates a significant mismatch between the labour force and the labour market, inhibiting innovation. Moreover, the lack of R&D investment in non-oil economic activities, the limited efforts invested in vocational training and the decreasing number of graduates in science and engineering also negatively affect the innovation capabilities available to the private sector (ADB, 2019).

Synthesis

The table here presents the main achievements of and challenges to R&D and innovation (RDI) in Azerbaijan, based on the findings described in this chapter.

Progress made so far

- Relatively high amounts of FDI attracted

Challenges ahead

- Foster the use of ICT and promoting the digitalization of the economy.
- Improve access to finance in the private sector.
- Direct investment efforts to improving productivity and developing skills in the labour force.
- Strengthen absorptive capacities and cooperation with educational institutions.
- Expand the kind of data collected on the innovation activities of firms

Source: UNECE.

Note

¹ Kheyfets, Igor, and Naveed Hassan Naqvi, Higher education institutions as drivers of innovation and growth in Azerbaijan, *Eurasian Perspectives*, World Bank Blogs, 13 December 2018.

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Website

Institute of Radiation Problems, Azerbaijan National Academy of Sciences, Department of Physical, Mathematical and Technical Sciences: <http://irp.science.az/?l=/static,32/lang,en>

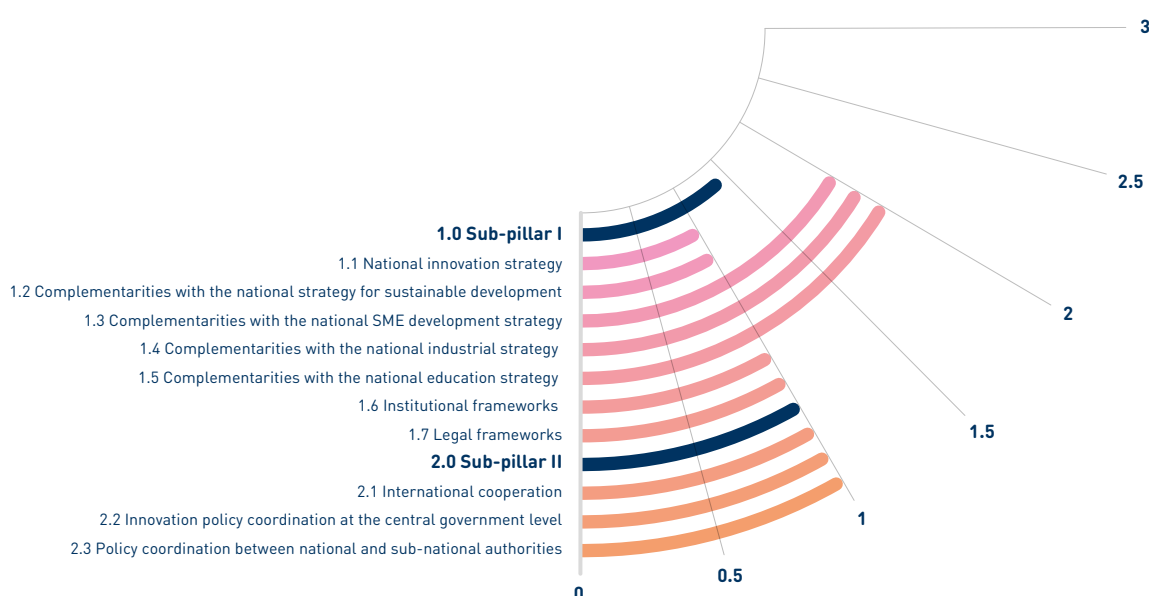
Chapter III

PILLAR I: INNOVATION POLICY GOVERNANCE

The first pillar of the IPO reviews the overarching strategic, institutional and legal framework for innovation policy, as well as the competences of and coordination among government bodies involved in innovation policy. This review assesses the extent to which innovation policy governance is sound, well-structured, efficient and flexible.

National innovation policy governance – strengths and weaknesses

Figure III.1 • Scoring of sub-pillars: innovation policy governance



Source: UNECE.

Note: Each indicator is assessed using a score from 3 to 0. The highest score (3) is given to fully fledged policy initiatives and mechanisms that can provide mutual learning opportunities for the EESC sub-region. A score of 2 is assigned if a policy initiative is operational. An indicator receives 1 point if a policy initiative is under development. The lowest score (0) is given if a country does not have a specific policy mechanism, strategic document or policy initiative. The indicators are based on an extensive questionnaire answered by national government agencies and external consultants. The questionnaire consists of open, binary and multiple-choice questions. Additional statistical data supplement the formal assessment framework by informing on key socioeconomic trends and context conditions. Statistical data are not directly integrated into the qualitative indicators but are used to guide scoring decisions. For more information, please refer to Methodology and Process.

Azerbaijan is actively developing a national innovation system, and the Government shows a consistently high level of commitment to innovation. In 2019, the Government took several important steps, ranging from preparing the national innovation strategy to establishing institutions with responsibilities for science and innovation. Azerbaijan has recently launched high-level events to foster synergies in innovation policy and unite stakeholders from the Government, the business sector, academia and international organizations. Two examples are InnoWeek and InnoFest, annual events that support innovation and entrepreneurship

Yet more progress is needed. New policy instruments are not yet fully operational. Both old and newly established authorities lack full capacities to formulate, design and implement innovation policy initiatives. Neither the central government nor national and subnational authorities coordinate policy to an extent that improves the overall efficiency and effectiveness of policymaking. Despite its potential in research and innovation, Azerbaijan is not fully engaged in international cooperation in science and technology. Insufficient financial support for enterprises, low governance quality and insufficient human capital, as well as inadequate regulation, hold back private sector innovation. To enable innovation-led economic growth, policy efforts thus need to continue in a systematic way.

Table III.1 Overview of sub-pillars and indicators for innovation policy governance

Sub-pillar I: Innovation Policy Frameworks	Sub-pillar II: Innovation Policy Coordination
National innovation strategy	International cooperation
Complementarities with other policy areas	Innovation policy coordination within the central government and between national and subnational authorities
Institutional frameworks	
Legal frameworks	

Source: UNECE.

Sub-pillar I: Innovation policy frameworks

Given the many government levels involved in designing and implementing innovation policy, it is vital to have a strategic document containing the Government's overarching vision.

National innovation strategy

Although economic diversification has been recognized as a policy priority at the highest level for two decades, it has not yet been realized. In 2012, the Government adopted Azerbaijan 2020: Vision for the Future, a development strategy for sustainable and inclusive economic growth. The strategy called for expanding the non-resource sector,

boosting innovation-led growth and developing human capital. The Strategic Road Map on the National Economy and Key Industrial Sectors of Azerbaijan (2016) put innovation-led growth front and centre. It included investment in human capital, physical infrastructure and institutional capacities. Efforts to diversify concentrate on agriculture, consumer goods, chemicals, ICT, tourism and manufacturing of machine tools (OECD, 2019).

Innovation policy remains fragmented, spread across legal and strategic documents and bodies with little coordination or alignment. To address gaps, a presidential decree of 10 January 2019 mandated that the Administration develop a national innovation strategy and action plan for adoption in 2020, with sector-specific national road maps for 2025 and related key performance indicators. The strategy seeks to solve several problems in the national innovation system and to introduce structured approaches to policymaking. Government support focuses on high-tech sectors, while neglecting innovation in low-tech ones.

Research and innovation are underfinanced, and the quality of research is below international standards. In 2018, R&D expenditure accounted for only 0.18 per cent of GDP, far below the average of 2.37 per cent among member countries of the Organization for Economic Cooperation and Development (OECD). In 2018, gross domestic expenditure on R&D as a share of GDP in Georgia was 0.3 per cent and in Ukraine it was 0.47 per cent. The low availability of financial resources to support R&D prevents innovation-led economic growth. The national innovation strategy sets out a goal to create funding programmes and policy instruments for applied research.

The broadly top-down approach to innovation policy limits the flexibility needed to adjust measures to emerging needs and opportunities. Policy measures do not sufficiently reflect the needs, demands and expectations of stakeholders, thus undermining the quality and impact of interventions. The strategy should enable bottom-up initiatives and support mixed approaches in national governance of science and innovation.

Complementarities with other policy areas

Several strategies steer innovation policy in Azerbaijan. An important one is the State Programme on Industrial Development 2015–2020, which aims to strengthen industrial and technological parks, set up new industrial parks and special economic zones, and raise the industrial capacity of regions. It contains several innovation-related measures, such as modernizing industrial facilities, increasing non-oil exports, improving energy efficiency, expanding knowledge-intensive production and developing skills in the labour force. It recognizes innovation as a key development driver and calls for investing in human capital and creating conditions for economic growth based on scientific advances. To help implement it, the Ministry of Economy launched an initiative promoting the sharing of international best practices with senior managers of domestic enterprises. In addition, with the Ministry of Transport, Communications and High Technologies (MTCHT), the ANAS and the Ministry of Foreign Affairs, the Ministry of Economy developed a programme to strengthen cooperation with foreign entities in science, technology and innovation.

In December 2016, to complement the programme, Azerbaijan adopted the Strategic Road Map for the Development of Heavy Industry and Engineering. The main objective is to enable Azerbaijani industrial companies to become integral parts of global

value chains and contribute to producing high value added goods. The road map introduces objectives that support industrial development by

- Focusing on emerging industries and high value added industrial sectors
- Attracting local and foreign investment in heavy industry and mechanical engineering
- Promoting the application of international standards and best practices in industry
- Creating mechanisms for transferring advanced manufacturing technologies
- Supporting innovation in domestic enterprises

The Strategic Road Map for the Production of Consumer Goods by Small and Medium Enterprises defined SME policy measures for 2016–2020. It aimed to create a favourable business environment and improve the regulatory framework for SME operation. It also aimed to simplify procedures for start-ups and decrease the number of inspections of businesses. In addition, it introduced frameworks for favourable taxation policy and conditions that encourage the development of SMEs. SMEs and start-ups are burdened by high taxes and by limited access to finance and sales channels. With these measures, the Government sought to broaden and improve access to financing for entrepreneurs and create export associations to expand the share of SMEs involved in exporting. The road map emphasized the importance of the national innovation system to providing SMEs with a pool of knowledge and the skills required to develop high value added products and services.

In 2018, the Government introduced tax incentives for innovative SMEs. The Tax Code adopted in 2019 provides tax exemption for small, innovative start-ups for three years after their founding. The Government also offers several funding mechanisms, mainly the SME Development Fund, the Agriculture Fund and the Innovation Agency Fund. The nascent venture capital market cannot provide enterprises with sufficient funding for RDI activities.

Implementation of the United Nations Sustainable Development Goals (SDGs) is governed by several policy documents. The National Strategy for the Conservation and Sustainable Use of Biodiversity in the Republic of Azerbaijan for 2017–2020 lays out protection measures and calls for scientific research in the field. In May 2019, Presidential Decree No. 1209, “On the acceleration of reforms in the energy sector of the Republic of Azerbaijan”, outlined key initiatives for developing the energy sector and energy-efficient technologies. The decree complements the strategic road map for developing thermal energy, water and gas supply published in December 2016.

The National Strategy for Information Society Development 2016–2020 sets out specific targets and assigns responsibility for achieving them to specific government institutions. Measures to be undertaken address technology parks, business incubators and initiatives for innovative entrepreneurship. The strategy includes several major infrastructural components, including the Azerspace Communications Satellite programme and the Trans-Eurasian Information Super Highway. The Government is working on developing a Google Cloud platform to provide cloud solutions for public authorities.

In 2015, the ICT industry accounted for 2 per cent of GDP, with a turnover of approximately \$972 million – and substantial potential for further growth. Yet, more investment is needed in hard and soft ICT infrastructure: Azerbaijan ranks 53rd on the Network Readiness Index of the World Economic Forum (2016) and 65th on the ICT Development Index of the International Telecommunication Union (2017) (chapter II).

E-governance is part and parcel of these efforts. To complement the development of digital government, the State Agency for Public Service and Social Innovations established service centres of the Azerbaijan Service and Assessment Network (ASAN) across the country. The service centres provide one-stop services for citizens using a single-window concept. The State Agency for Public Service and Social Innovation manages more than 100 services including a digital system for electronic visas, the ASAN payment system, a digital platform for communal services and the Abad platform to help entrepreneurs to find national and international sale channels. In 2015, for its governance model and its contribution to the effectiveness and efficiency of public services, the agency received the United Nations Public Service Award.

Institutional frameworks

In 2017, the Government set up the Small and Medium Business Development Agency (SMBDA). The SMBDA provides direct financial support through the SME Development Fund and other funding mechanisms and, with the Ministry of Finance, is developing financial incentive schemes for start-ups. It also supports the national innovation policy. The agency contributes to innovation laws, innovation-related diaspora engagement and enterprise skill development, such as through training on tax legislation and training on entrepreneurship for women. The SMBDA is planning to open regional offices, to be available also to other public bodies such as those working on promoting innovation in the private sector.

In 2019, after merging the ICT Fund and the High-Tech Park Azerbaijan, the Government established the Innovation Agency. The agency provides financial support for innovative projects, including for commercializing research, as well as for acceleration programmes such as Idea to Business and Fast Track. In the past, the ICT Fund distributed grants, with a maximum amount of AZN 50,000. The Innovation Agency plans to increase the maximum amount to AZN 500,000, to support ambitious innovation projects that have large scope and scale.

The Innovation Agency's role as a facilitator of innovation activities is not entirely clear or well defined, as some of its mandates overlap with those of other government authorities with responsibilities for science and innovation. The agency still lacks mechanisms for ensuring the efficiency and effectiveness of its operations and has yet to conduct either market failure analyses or cost-benefit analyses. In addition to providing financial support to innovation actors, government authorities should actively contribute to strengthening the enabling environment for RDI and developing elements of the national science and innovation system (such as incubators, accelerators and technology transfer offices).

To strengthen Government support for innovation, the President signed decrees on innovation policy in January 2019 that made the Administration the main public authority responsible for formulating and implementing national innovation policy. In 2018 it had established the Department of Innovative Development and e-Government to coordinate science and innovation policy initiatives as well as the development of digital government. In each government department, appointed chief innovation officers report twice a year on measures related to supporting science and innovation. Azerbaijan does not have a permanent national innovation council, but some attempts have been made to reduce the degree of fragmentation of policy and to foster synergies through intraministerial working groups.

Legal frameworks

In parallel with developing the national innovation strategy, the Government is working on improving laws and regulations to enable and support research and innovation. Although it still lacks a national coordination framework, the Government has made progress in improving bankruptcy procedures, business licensing and regulatory impact assessments. The Presidential Decree on Additional Measures for Entrepreneurship Development of 3 March 2014 simplified business regulations and streamlined public inspection procedures. Mechanisms for protecting intellectual property rights are well developed but not sufficiently enforced. Legal frameworks lack definitions of some key innovation actors such as start-ups, making it challenging to develop supporting regulations. Regulations on venture capital investment and business insolvency do not exist. Public procurement is governed by the 2001 Law on Public Procurement, which is updated regularly; the latest amendments, related to reductions of tender durations, occurred in December 2018. Public procurement authorities have not mainstreamed support of innovation in their policies and processes, leaving substantial potential untapped in a country where government expenditure accounts for almost 30 per cent of GDP (\$14.8 billion in 2019) (TPPR, 2020).

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ General awareness of the importance of innovation-led growth exists and it is a priority, as documented in various strategies and official documents. ✓ A national innovation strategy has been developed, and government bodies in charge of innovation policy have been set up. ✓ The Government has made progress in developing digital government platforms and public sector innovation. 			
Area for improvement	Recommendation	Time frame	Responsibility
• Funding of RDI is low.	✓ Increase funding of RDI and improve the efficiency and accountability of public expenditure, by adopting best governance practices and establishing full-fledged monitoring and assessment mechanisms for public funding of RDI.	Long-term	Government
• The absence of a clear definition of start-ups in national legislation makes it very challenging to develop well-functioning policy initiatives aimed at promoting RDI activities in start-ups.	✓ Adopt legal acts that introduce the term “start-up” into policymaking.	Short-term	Government
• Azerbaijan does not have legal frameworks for insolvency or for venture capital.	✓ Close the gaps in legislation related to insolvency regulations and venture capital investment, to enable greater dynamism of innovation activities in the business sector.	Short-term	Government
• Government support concentrates on high-tech sectors. Systematic efforts to support innovation in sectors with lower uptake of advanced technologies are lacking.	<ul style="list-style-type: none"> ✓ Expand the scope of science and innovation policy. ✓ Ensure that the Government provides sufficient support for RDI activities in the service sector and in industries with lower technological intensity, in addition to high-tech industries. 	Medium-term	Government
• The design of public procurement frameworks does not support innovation.	✓ Assess the potential of innovation-enhancing procurement.	Short-term	Government

Source: UNECE.

Sub-pillar II: Innovation policy coordination

Coordinated approaches help avoid overlapping, duplicating or omitting actions required to implement innovation policy successfully.

International cooperation

At an international crossroads and with strong cultural and historic linkages with the Russian Federation, the Islamic Republic of Iran and Turkey, Azerbaijan could play a significant role in regional cooperation and development. It could become a gateway country for investment into the surrounding region. Azerbaijan is actively expanding cooperation with Gulf countries, organizing the Falcons Summit in 2019 to bring together innovative start-ups and investors from Azerbaijan, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, and setting up a joint fund with Saudi Arabia. Azerbaijan actively cooperates with post-Soviet and Islamic states on advancing technology-intensive industrial sectors and supporting start-ups.

Azerbaijan also maintains strong cooperation with the EU – already its largest investor and largest trading partner. The EU-Azerbaijan Partnership and Cooperation Agreement supports the diffusion of international best practices in governance and closer alignment with international industrial standards. Azerbaijan is a non-associated country in the EU Horizon 2020 programme, which opens up opportunities for Azerbaijani researchers to collaborate with international peers and compete for international funding.

Foreign partners fund most international mobility programmes for researchers and students, with no contribution from the Azerbaijani Government. However, all of these initiatives operate on the basis of bilateral agreements with the Ministry of Education. During 2007–2015, some 3,500 students received scholarships to study in foreign HEIs through the State Programme on Education of Azerbaijani Youth Abroad. The President's Youth Foundation provides students with full or partial stipends for education at leading universities abroad.

The German Academic Exchange Services provides funds each year for 100 Azerbaijani nationals to participate in undergraduate and graduate programmes. The United States Embassy offers degree as well as non-degree programmes in science and technology. Azerbaijani HEIs foster collaboration with European research partners through bilateral agreements. Examples include those of the Brandenburgische Technische Universität Cottbus-Senftenberg with the Azerbaijan Technical University and of Humboldt Universität Berlin with ADA University and Baku State University.

Innovation policy coordination within the central government and between national and subnational authorities

Public authorities with responsibilities for science and innovation develop their measures in silos, as both formal and informal mechanisms are insufficient to ensure that innovation policy is coordinated. In January 2019, the President signed Decree No. 881, "On coordination in the field of innovative development in Azerbaijan", which will set up the Coordination Council for Science and Innovation Policy. The Council will consist of

representatives of all ministries, the ANAS and central executive bodies. Once operational, the Council is expected to lead the coordination of policy as well as efforts to improve the national science and innovation system. Other mechanisms for coordinating innovation policy between government authorities, such as joint working groups, are lacking.

Coordination among national and subnational authorities is also not yet institutionalized. Some policy measures are targeted at resolving innovation policy challenges at a regional level. In accordance with the State Policy on Social and Economic Development of the Regions of the Republic of Azerbaijan for 2019–2023, local governments – jointly with the MTCHT – should provide support to young entrepreneurs and start-ups and build their skills.

Sub-pillar II: Evaluation and recommendations

The national science and innovation policy landscape remains fragmented. Successful implementation of science and innovation policy requires clearly defining the mandates of all government authorities with responsibilities for science and innovation. It is critical to ensure that science and innovation policy initiatives are coordinated at central, regional and local levels to avoid duplicating functions and to foster positive synergies. The first step in this direction could be the launch of the national Coordination Council, which should unite all relevant public and private stakeholders. Because international cooperation in science and innovation is not fully developed, there is a need to establish effective mechanisms for knowledge spillovers from international partners to the domestic economy and civil society.

Sub-pillar II		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Linkages with foreign partners in science and innovation are historically strong. ✓ The Government created the Coordination Council for Science and Innovation Policy. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The country engages only marginally in international research collaboration. 	<ul style="list-style-type: none"> ✓ Design programmes supporting the international mobility of researchers and students and the development of joint research. 	Medium-term	Government
	<ul style="list-style-type: none"> ✓ Provide qualification measures for Azerbaijani research organizations on how to manage applications for international funding and provide support to set up internal structures. 		
<ul style="list-style-type: none"> • Coordination of science and innovation policy initiatives is limited: public authorities with responsibilities for science and innovation develop their measures in silos. Some mandates for implementing science and innovation policy initiatives are missing or not enforced sufficiently. 	<ul style="list-style-type: none"> ✓ Make the Coordination Council for Science and Innovation Policy fully operational. 	Medium-term	Government
	<ul style="list-style-type: none"> ✓ Establish coordination working groups among government authorities with responsibilities for science and innovation. 		
	<ul style="list-style-type: none"> ✓ Ensure the free exchange of data on RDI funding within the Government. 		

Source: UNECE.

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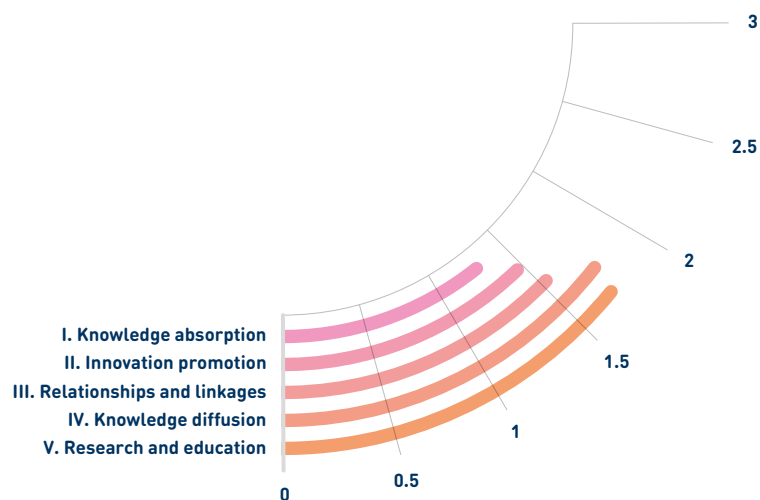
Chapter IV

PILLAR II: INNOVATION POLICY TOOLS

This chapter reviews the policy mechanisms in Azerbaijan that enable, promote and diffuse innovation. It addresses five sub-pillars: knowledge absorption, innovation promotion, relationships and linkages, knowledge diffusion, and research and education.

National innovation policy mix – strengths and weaknesses

Figure IV.1 • Scoring of sub-pillars: innovation policy tools



Source: UNECE.

Note: The IPO pillar scoring is calculated on the basis of the average quantitative assessment of individual indicators under each sub-pillar. In the evaluation all support measures in a given area are taken into account and special consideration is paid to indirect contributions from external mechanisms. The overall band score for each sub-pillar forms the following generalized categories: 0.0–0.5, No policy instruments/mechanisms exist; 0.5–1.5, Policy efforts are in their initial stage of development; 1.5–2.5, Policy efforts are evident and partial implementation takes place; 2.5+, Policy efforts are comprehensive and monitoring activities are systematic. The scores for individual indicators are as follows: 0, No policy instrument/mechanism exists; 1, A policy measure/s is/are under development /has/have partial or indirect impact; 2, A policy scheme/s is/are operational and implementation has started; 3, Implementation is advanced and evaluation/impact assessment is taking place. Policy measures with sector-specific or partial or non-targeted impact on a given area are subject to case-by-case evaluation. For a more detailed discussion of the IPO scoring methodology, please refer to Methodology and Process.

The national development strategy, Azerbaijan 2020: Vision for the Future, emphasizes innovation-driven growth and led to a range of new and emerging measures to achieve this end. The IPO analysis of policy identified relatively even development of policy support measures in all five sub-pillars, with stronger performance on *Knowledge diffusion* and *Research and education*, relative to *Relationships and linkages*, *Innovation promotion* and *Knowledge absorption* (figure IV.1). Indeed, in recent years the country has focused more sharply on entrepreneurship, investment into connectivity and the use of e-governance to modernize public services. The Innovation Agency is a dedicated agency unifying the delivery of policy support for knowledge-based development in the country. In addition, public-private partnerships work towards aligning support measures with current market needs and build synergies for creating a knowledge-based economy. Several areas for improvement remain, including early-stage investment and other types of support for innovative start-ups as well as support for industry-science collaboration. Filling these gaps is important to develop and sustain a well-functioning innovation system and to harness the potential for innovation-driven growth in Azerbaijan.

Table IV.1 Overview of sub-pillars and indicators for innovation policy tools

Sub-pillar I: Knowledge Absorption	Sub-pillar II: Innovation Promotion	Sub-pillar III: Relationships and Linkages	Sub-pillar IV: Knowledge Diffusion	Sub-pillar V: Research and Education
Promotion of public and private sector organizational and managerial practices	Business plan and start-up competitions	Innovation voucher schemes	Information and brokerage schemes for technology upgrading	Policies to increase the number of science, technology, engineering and mathematics graduates
Schemes to support the development of technical and business services	R&D loans	Cooperative R&D grants	Standards, testing and certification instruments for SMEs	Policies to foster research development
Fiscal incentives for acquiring knowledge capital	VAT exemptions	Supplier matching services	Industrial technology assistance programmes and extension services for SMEs	
	Technology incubators	S&T parks	Public procurement for innovation	
		Innovation spaces	Digitalization	
		Technology accelerators		
		Business networks and clusters		
		Academia-industry linkages		
		Diaspora networks		
		Gender equality		

Source: UNECE.

Sub-pillar I: Knowledge absorption

The process of assimilating external knowledge plays a substantial role in developing dynamic core competencies, as well as in gaining competitive advantage and creating new value chains.

Promotion of public and private sector organizational and managerial practices

The primary provider of capacity-building services is the Small and Medium Business Development Agency (SMBDA), established in 2017. The agency recently developed a platform with training modules for SMEs, as well as a management training programme in partnership with GLZ, the German development agency for international cooperation. It is still too early to assess the impact of these measures. The Innoland Incubation and Acceleration Centre and the Barama Innovation and Entrepreneurship Centre provide IT and business training for programme participants in addition to mentor support, networking and access to investors. Although no dedicated scheme exists to promote organizational and managerial practices, process innovation has transformed organizational practices in the public sector. The ASAN one-stop shop model provides a unified and coordinated way to deliver public services, and the ASAN Service Centres ensure transparency in the activities of State bodies. Both the State and citizens evaluate public services, forming the basis for systematic improvements. Nevertheless, coordinated efforts are needed to increase efficiency and improve managerial practices in both the public and the private sector. The National Strategy on Development of Civil Services 2019–2025 (adopted in 2018) envisions the development of training modules and programmes for human resource management for civil service executives, among other activities.

Schemes to support development of technical and business services

The measures in place to optimize the provision of technical and business services are outlined by a 2019 Presidential decree supporting the development of the private sector, in particular the SME competitiveness and market entry. Despite the existence of a set policy and institutional framework, technical and business services are in demand on the domestic market: as of 2018, less than 20 per cent of Azerbaijani SMEs had benefited from publicly funded or co-funded business development services, according to the OECD SME Policy Index 2020 (OECD and others, 2020). The hitherto fragmented business support infrastructure is being restructured, with the SMBDA developing a model business factory, among other schemes to promote technical and business services in the domestic market.

Fiscal incentives for acquiring knowledge capital

Fiscal incentives for innovation cover resident companies based in high-technology and industrial parks, such as those in Pirallahi and Mingachevir. They include exemptions from taxes on property, value added (VAT) and corporate income. In addition, a policy and institutional framework has been developed to support small innovative start-ups and SME

clusters: according to the amended Tax Code of 2019, start-up beneficiaries are exempt from income tax for three years from their certification date, and cluster companies are eligible for a seven-year exemption from corporate and property tax, as well as VAT on qualifying imported machinery and equipment. The mechanisms for establishing start-ups and SME clusters are still in development. An interministerial committee is developing selection criteria and processes for issuing start-up certificates. Following their adoption, the Government is expected to start implementing fiscal incentives for innovation.

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ The SMBDA is developing a platform with training modules for SMEs. ✓ A unified and coordinated manner of delivering public services is in place through the ASAN. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy measures related to knowledge absorption do not sufficiently address the promotion of non-technological innovation in the public and private sectors. 	<ul style="list-style-type: none"> ✓ Promote organizational and managerial practices by extending measures for stimulating non-technological innovation. 	Medium-term	Academy of Public Administration
	<ul style="list-style-type: none"> ✓ Create dedicated schemes for promoting such practices, with set measures (such as training programmes and lifelong learning) aligned with the core priorities for developing the civil service and business environment. 		
<ul style="list-style-type: none"> • Both the provision of technical and business services and policy mechanisms for cooperating with private sector service providers are limited. 	<ul style="list-style-type: none"> ✓ Conduct an analysis of the market for technical and business services to identify potential mismatches and services in demand. 	Short-term	SMBDA
	<ul style="list-style-type: none"> ✓ Regularly monitor private sector provision of such services. 		
	<ul style="list-style-type: none"> ✓ Create a register of service providers. 		
	<ul style="list-style-type: none"> ✓ Promote market-based provision of technical and business services by stimulating the use of private sector service providers. 		
	<ul style="list-style-type: none"> ✓ Introduce quality assurance mechanisms and/or certification programmes. 		
	<ul style="list-style-type: none"> ✓ Offer basic technical and business services that do not compete with private sector offerings, as based on the assessment conducted, in particular for soft skills (for example, mentorship programmes, workshops). 		

Source: UNECE.

Sub-pillar II: Innovation promotion

Promoting innovation requires governments to invest in establishing platforms where young companies can develop and test innovative ideas.

Business plan and start-up competitions

The number of business plan and start-up competitions focusing on innovation has been growing steadily in the past decade (table IV.2). Multiple events are held; examples include the National Innovation Challenge of the Ministry of Economy and the joint project with the Ministry of Transport, Communications and High Technologies (MTCHT) called From Idea to Business (I2B),¹ which involves start-up tours and aims to develop the start-up movement in Azerbaijan. A challenge for these competitions is that after distributing funds, many do not have follow-up mechanisms, including professional mentorship and guidance following the receipt of seed capital.

Table IV.2 Business plan and start-up competitions in Azerbaijan

Competition	Implemented by	Funded by	Number of participants	Frequency	Outcome to date
Creative Business Cup	Social Innovation Lab	Ministry of Culture	19 in 2019	Annual since 2018	A five-week Creative Business Cup training and coaching programme for 15 successful applicants
Climate Launchpad	Social Innovation Lab	Barama Innovation and Entrepreneurship Centre	83 in 2018	Annual since 2017	Direct access to the Climate-KIC Accelerator and an eight-week intensive training course for the top 10 competitors
Imagine Camp	Microsoft	MTCHT, Ministry of Education, Ministry of Youth and Sport, Copyright Agency, Microsoft Azerbaijan, PASHA Bank, Nar Mobile	15 in 2018	Annual since 2015	Cash prizes distributed to top three start-ups annually
Inclusivity Hackathon	UNDP	Ministry of Education	16	Piloted in 2019	One project awarded a cash prize; two projects assisted with links with investors
National Innovation Challenge	Social Innovation Lab	Ministry of Economy, United Nations Office in Azerbaijan	220 in 2018	Annual since 2017	Cash prizes to top three start-ups annually
New Generation	Youth Inc	Ministry of Youth and Sport, Coca-Cola Company	25 in 2019	Annual since 2018	Cash prizes for the top three start-ups annually
New Idea start-up competition	Baku Engineering University	BP	148 in 2017	Annual since 2013	842 projects supported (100 financially)
NewSpace Business Accelerator	AzerCosmos and Social Innovation Lab	Azerbaijani-French University	40 (from 5 countries)	Annual since 2018	Seed investment in three winning projects
Seedstars World	Barama Innovation and Entrepreneurship Centre	Azercell Telecom	N/A	Annual since 2013	Training and access to investment network for the 10 best start-ups annually

Source: UNECE.

Support for RDI investment

Obtaining early-stage finance for innovative projects is a major challenge for entrepreneurs in Azerbaijan. Until 2017, R&D loans were distributed by the State ICT Fund, established by the MTCHT in 2012. The Fund allocated grants – mainly to SMEs – for developing software products, innovative infrastructure projects and e-services. Because of various limitations, including a lack of follow-up mechanisms and funding of non-viable projects, the MTCHT dissolved the Fund. Under a recently approved policy framework, the Innovation Agency is developing a mechanism for distributing preferential loans.² Local entrepreneurs can also obtain funding from traditional banks; however, the high collateral requested for risky projects often forces start-ups to put their projects on hold. A venture capital industry is beginning to emerge, with several funds established in recent years, but more time is needed for the industry to develop and make an impact on innovative development. General support in business development is also provided by the SMBDA. The start-up movement is further supported by large, private sector companies (such as Azerfon, AzerTurkBank, PASHA Bank and Procter & Gamble) that sponsor hackathons and innovation competitions in the framework of their corporate social responsibility policies.

Technology incubators and accelerators

The emerging scene of technology incubators has seen several structures established in recent years (table IV.4). For example, the Barama Innovation and Entrepreneurship Centre of AzerCell Telecom – the first business incubator in Azerbaijan, created in 2009 – is supported by the Innovation Agency. As of 2017, the Centre had hosted more than

Table IV.3 Incubators and accelerators

Incubator		Accelerator	
Name	Location	Name	Location
ADA Innovation Centre	ADA University	Barama Innovation and Entrepreneurship Centre	Innovation Agency
ADAU Innovation Centre	Azerbaijan State Agricultural University (ADAU)	Climate Launchpad	Social Innovation Lab
APPLab	Innoland	Fast-Track Acceleration Programme	Innovation Agency
Barama	Innovation Agency	NewSpace	Azercosmos
BMU Innovation Centre and Technopark	Baku Engineering University	Social Innovation Lab	Social Innovation Lab
EAZI Start-up Centre	Azerbaijan State Oil and Industry University	SUPaz	Innoland
Innovative Business Incubator	State Economics University		
Next Step	Innoland		
Technovate	Farid Ismayilzada		
Youth Inc, Entrepreneurship Programme & Business Incubation Centre	Youth Inc		

Source: UNECE.

300 events and launched 45 start-ups. One issue for incubators is that the role of government agencies often overlaps with the activities of the private sector in providing support for innovative start-ups and SMEs. Many activities of technology incubators are outlined by the Model Regulations on Technology Parks (2014); however, the lack of a clear policy framework defining technology incubators impedes the development of innovative projects. The situation could be improved by standardizing private sector provision of incubation services. Similarly, technology accelerators are outlined in the charter of the Innovation Agency, which has several programmes providing technical, legal and financial services to start-up projects. Among the schemes are the first tech accelerator in the country – Fast Track, established by the Innovation Agency – as well as the SUP accelerator at Innoland Incubation and Acceleration Centre, which expanded internationally following its Demo Day in 2019.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ Institutional reforms for developing the business environment were undertaken with the establishment of the SMBDA as a specialized agency for SME development.
- ✓ Several entities provide start-ups with Incubation services, in addition to co-working space and assistance with investment attraction.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Support tools for promoting innovation do not sufficiently address the low access to early-stage finance, which obstructs the development and implementation of innovative projects. 	<ul style="list-style-type: none"> ✓ Develop a venture finance mechanism (in cooperation with international donors) to overcome the early-stage financing gap and make possible innovative projects and technological creativity. 	Medium-term	Innovation Agency
<ul style="list-style-type: none"> • The lack of a policy framework for technology incubators obstructs the development of start-ups and compounds existing overlaps in the support activities of government agencies and the private sector. 	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the institutional framework for start-up support 	Short-term	Innovation Agency Ministry of Economy MTCHT
	<ul style="list-style-type: none"> ✓ Develop a policy framework for the activities of private incubators that are involved with developing innovative SMEs. 		
<ul style="list-style-type: none"> • The policy and institutional framework of business plan and start-up competitions does not cover follow-up mechanisms or monitoring of beneficiaries' progress. 	<ul style="list-style-type: none"> ✓ Develop a strategic evaluation framework for business plan and start-up competitions to follow up on beneficiary projects and evaluate the effectiveness of schemes. 	Short-term	SMBDA
	<ul style="list-style-type: none"> ✓ Consider applying co-financing schemes to increase the number of viable projects that receive funding. 		

Source: UNECE.

Sub-pillar III: Relationships and linkages

Schemes that promote linkages between science and industries help create innovative ecosystems by assisting scientists and businesspeople in commercializing research, creating products and developing organizational processes.

Business networks and clusters

Cooperation among businesses in Azerbaijan takes place in part through business associations. The 12 associations registered in 2019 organize sector-specific training in business and skills development. Most associations aim primarily to promote agricultural exports or IT-related products. In this regard, the Azerbaijan Innovation Export Consortium is the main actor. Supporting such business networks are recent initiatives such as the MAINTeCH innovation and technology forum and the Caspian Innovation Conference (organized by the MTCHT in 2018), which serve as collaboration platforms in the ICT sector. Furthermore, the annual exhibition of IT – Innovations and High Technologies Bakutel – serves as a platform for cooperation and cross-promotion, supporting business networks in the country.

Supplier-matching services facilitate the export of local production by linking local producers with foreign buyers through online platforms, such as the Baku E-Trade Forum. The Digital Trade Hub, a public-private partnership initiative implemented by Best Solutions in cooperation with the MTCHT in 2019, applies a novel approach to e-commerce (see digitalization and e-governance under sub-pillar IV). Several support measures are also in development in government entities. The SMBDA is in charge of creating an e-network of SMEs in the country, as well as managing a supply chain system and a procurement network of entrepreneurship. Network building is also included in the mandate of the Innovation Agency.

Innovation support infrastructure

The ANAS High-Technology Park was established by a Presidential decree in 2016 to expand high-technology production and develop modern scientific and technological innovations (Azerbaijan, Order of the President, 2016). Starting in 2019, a public procurement mechanism applied to products manufactured at the park has stimulated the production of innovative goods. Five industrial parks are registered as sector-specific manufacturing compounds, containing large conglomerates that receive a range of fiscal incentives (table IV.6). Although these parks offer space and physical infrastructure, few provide technical and business services to residents. Some, including the ANAS park and the Sumqayıt Chemical Industrial Park, offer incubation and consulting services. The development of innovative start-ups and SMEs thus requires a greater orientation towards services, which are in demand across the subregion.

A main player on the innovation scene is Innoland Incubation and Acceleration Centre, which houses the SUP accelerator, Next Step and Khazar Ventures. Innoland operates on a public-private partnership model formed through the ASAN and initiated by the State

Table IV.4 Industrial and high-technology parks

Name/location	Industry	Residents	Established
ANAS High-Technology Park	High-tech engineering innovation, educational technology	9	2016
Balakhani	Recycling (motor oils, plastic, paper and cardboard products)	10	2011
Garadagh	Shipyard and ship repair	1	2015
Mingachevir	Light industry (textiles, leather, cotton products and so on)	1	2016
Pirallahi	Pharmaceuticals, medicinal products	5	2017
Sumgait Chemical Industrial Park	Polymers, construction materials, machinery and equipment	18	2011

Source: UNECE.

Agency for Public Service and Social Innovations, which co-funds start-up projects and offers links with investors, IT training and educational programmes. Self-funded, Innoland has several main investors based in Silicon Valley, some of which are members of the Azerbaijani tech diaspora.

Academia-industry collaboration and mobility

Although no institutionalized industry research networks exist in Azerbaijan, universities run multiple ad hoc projects that facilitate the inclusion of industry in research. For instance, the Innovation Centre and Technopark of Baku Engineering University brings together about 20 companies to work on joint and independent projects with students and faculty members, and ADA University cooperates with the private sector on developing business solutions tailored to market needs. The State Economics University also implements a virtual labour exchange project and targeted work placements. It applies a researcher evaluation approach that is based on the scientific activity of teaching staff. Despite these efforts, industry-science linkages in Azerbaijan are not yet sufficiently developed. Sustainable partnerships are needed to unite business and research communities. To this end, for example, an innovation lab is planned for Mingachevir State University.

Diaspora networks

The Government has undertaken several schemes to strengthen diaspora networks, such as the first summer camp for Azerbaijani living abroad and the establishment of a Diasporas Youth organization in 2018. Cultural centres and language schools operate in several other countries, including Belarus, Belgium, the Russian Federation and Ukraine. In addition, to ensure cooperation among diaspora organizations, Azerbaijani coordination councils have been established in the Baltic States, France, Germany, Italy, the Netherlands, Spain, Switzerland, and Sweden to ensure cooperation among diaspora organizations. The State Committee on Affairs with Diaspora further organizes and hosts special events, roundtables and gatherings to improve the process of integrating Azerbaijanis living abroad. In addition, the SMBDA supports innovation-related engagement of the diaspora on an ad hoc basis (chapter III). In 2020, to help develop the start-up ecosystem in Azerbaijan, the Innoland Incubation and Acceleration Centre opened the Azerbaijan Innovation House at Stanford University in Silicon Valley, featuring the first forum of “tech diaspora”.

Gender equality

Azerbaijani legislation that instils the principle of equality and prohibits discrimination on the basis of gender includes the Law on Gender Equality (2006), the ratification of the UN Convention on the Elimination of all Forms of Discrimination Against Women and the adoption of several acts on gender equality. Female empowerment platforms also exist (such as WoWomen and TechTech Khanum), as well as conferences and centres to encourage women’s participation, mainly in the IT sector (for example, the Ada Legacy annual conference and Femmes Digitales ICT Club). Nevertheless, challenges are still present in social expectations, the gender wage gap and access to childcare facilities. According to the State Statistical Committee, women occupy about 28 per cent of civil servant positions in the highest ranks (from level 3 to senior classification positions) and 21 per cent of administrative positions in the lower ranks (level 4 to 7) (Azerbaijan, State Statistical Committee, 2020b). Women occupied the majority of the supplemental positions in civil service (56 per cent) as of 2019. In addition, although female employment has risen steadily in Azerbaijan over the last decade, the rise has taken place primarily in rural areas, where women are most likely to be employed in low-wage agricultural industries. At the same time, the number of women engaged in entrepreneurial activities is less than a third of the number of men as of 2019; both men and women are engaged mainly in the trade sector. The percentage of women holding positions in the decision-making process also continues to lag far behind that of men. An additional challenge is the availability and affordability of childcare – attendance and enrolment rates for early childhood development programmes are very low, especially in rural areas.

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ The innovation infrastructure supported by the Government includes several facilities that offer start-ups co-working space and incubation and acceleration services, as well as three high-technology parks and five industrial parks.
- ✓ Several schemes to develop diaspora networks have recently begun building on existing partnerships.
- ✓ Policy tools that support gender equality in the IT sector include female empowerment platforms, conference events and centres that encourage women to participate.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy tools do not provide sufficient stimulation for joint projects between industry and academia, to strengthen linkages for innovative development. 	<ul style="list-style-type: none"> ✓ Support science-industry collaboration and stimulate commercialization of innovative ideas by introducing early-stage finance for non-competitive financial support (such as innovation voucher schemes). 	Medium-term	Innovation Agency ANAS
	<ul style="list-style-type: none"> ✓ Consider reinstating a cooperative R&D grant programme to stimulate cooperation between innovative enterprises and public R&D institutions. 		
	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the policy mix for stimulating industry-academia collaboration and set up a framework for monitoring joint activities to identify trends and areas that need policy support. 		

Sub-pillar III		IPO evaluation and recommendations (Concluded)	
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The impact of the innovation support infrastructure is not assessed regularly. 	<ul style="list-style-type: none"> Set up a framework for regular monitoring and evaluation of innovation infrastructure elements to identify and provide value added solutions based on current market needs and further stimulate start-up development. 	Short-term	MTCHT
<ul style="list-style-type: none"> Mechanisms for stimulating mobility between academia and industry are limited and mainly cover separate projects within universities. 	<ul style="list-style-type: none"> Strengthen industry-science linkages and the entrepreneurial experience of researchers by applying an effective approach for increasing mobility between industry and academia. 	Short-term	Ministry of Education
	<ul style="list-style-type: none"> Develop a national unified and coordinated scheme, to consolidate under one umbrella the policy tools in the area (for example, sabbatical leaves, compulsory placements). 		

Source: UNECE.

Sub-pillar IV: Knowledge diffusion

Mechanisms that ensure equal and widespread access to information are vital to creating an innovative ecosystem in both the public and the private sector, serving as channels for the distribution and intersectoral flow of information.

Standards, testing and certification

The institutional framework for standards and technical regulations in Azerbaijan has recently been reorganized. A new law on standardization and a state programme on compliance with international standards were implemented in 2019. In 2018 the State Committee on Standardization, Metrology and Patents was liquidated. In its stead, two new agencies were established by Presidential decree, each specializing in separate elements of policy support – the State Agency for Antimonopoly and Control of Consumer Market of the Republic of Azerbaijan and the Agency on Intellectual Property. It is expected that the new institutional framework will account for improved efficiency in the delivery of public services. In addition, during 2010–2018 an EU twinning project on standardization, technical regulation, accreditation and metrology served to assist Azerbaijan in bringing standards in compliance with those of the EU. At present, 45 per cent of national standards are compliant. A main challenge remains to increase the level of awareness regarding the reforms and regulations on start-up certificates.

Digitalization and e-governance

The Strategic Road Map for Development of Telecommunication and Information Technologies in Azerbaijan (approved in 2016) sets out digitalization objectives along with a nationwide action plan for the ICT sector. Actions implemented under the strategic road map's targets for 2017 were in the areas of overall ICT development, increased productivity

and performance efficiency in business activity, and digitalization of the government and social environment. The expansion of ICT infrastructure has improved connectivity, as signified by increased internet use among the population. The State Agency for Public Service and Social Innovations has established the E-GOV Development Centre, with two portals for public services now operational. E-commerce has also been expanded with the recent development of the Digital Trade Hub platform (box IV.1), connecting SMEs to global markets regardless of their location.

Box IV.1 Digital Trade Hub

The Digital Trade Hub is the first e-trade and e-commerce platform in Azerbaijan – and the subregion – to support SMEs on the domestic (and global) market, while optimizing the domestic infrastructure potential (chapter 2). Developed by Best Solutions and under the management of the Centre for Analysis of Economic Reforms and Communication, this public-private partnership was designed with consideration of international best practices in the field. It offers global B2B (business-to-business) e-commerce and B2G (business-to-government) e-services, including e-customs, e-apostilles, shipping documents, business start-up, e-banking and tax returns. Among its many functions, the platform provides e-residency services, empowering entrepreneurs around the world to set up and run a location-independent business in Azerbaijan with the issuance of a mobile ID for non-residents.

Access to and use of data was facilitated through the MTCHT's establishment of a unified data processing centre, in accordance with ISO standards. This was followed recently by work on developing a government cloud (G-cloud). High-performance computing solutions are developed at an Internet of Things Laboratory, boosting the digital economy, and the annual high-tech exhibition BAKUTEL showcases ICT innovations and digital solutions. An ICT innovation network is being developed as part of the project EU4Digital, supporting the development of the digital economy in the sub-region. According to the 2019 digital development overview of Azerbaijan prepared by the Asian Development Bank, technical and vocational education and training in ICT is not yet developed. The inclusion of modern ICT facilities and training instructors is needed in order to develop an education system that meets market needs. A positive development in this direction is the launch of the Baku State Vocational Education Centre of Industry and Innovations in September 2019.

Other policy tools

In line with the sub-regional trend, policy tools in Azerbaijan do not sufficiently address the present gaps in knowledge diffusion, with regard to leveraging the potential of public procurement to support innovation and industrial technology assistance. Nevertheless, efforts have been made to develop a policy framework for the former. In 2019, the Government adopted a resolution regulating the procurement of goods produced in the ANAS technology park (Azerbaijan, Cabinet of Ministers, 2019). It could apply the ample potential of public procurement further through pilot initiatives for innovative solutions, as well as broader uptake of technology. AZPROMO – the Export Promotion Agency – administers a scheme for industrial technology assistance that does not generate enough interest, revealing a need to better address underlying issues of firm capacity.

Sub-pillar IV IPO evaluation and recommendations

Achievements

- ✓ Public provisions to innovative start-ups have been expanded to include information and brokerage services, as well as access to international markets.
- ✓ Policymakers have made digitalization a priority, with broader initiatives for improving e-government, accessing and using data, and obtaining G2B services.
- ✓ Institutional reforms through the establishment of specialized legal entities for standards, testing and certification are a positive development in the direction of quality assurance.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Despite significant public expenditure as a share of GDP (30 per cent in 2019), the Government has not yet fully explored the potential of public procurement to stimulate innovative activity on the demand side. 	<ul style="list-style-type: none"> ✓ Promote broader uptake of technology using public procurement as an innovation policy tool. 	Medium-term	State Procurement Agency
	<ul style="list-style-type: none"> ✓ Develop framework conditions and organizational capabilities, identify and signal market needs, and mainstream support of innovation in policies and processes. 		
	<ul style="list-style-type: none"> ✓ Introduce pilot initiatives for public procurement, to explore opportunities for further modernizing public sector institutions and to assess the potential of demand-driven policies for socioeconomic development. 		
<ul style="list-style-type: none"> • The co-financing mechanism in industrial technology assistance for SMEs suffers from low uptake by qualified applicants. 	<ul style="list-style-type: none"> ✓ Apply an effective approach to raising awareness of existing schemes and to boosting public interest (for example, dissemination of informational material, collection and promotion of success stories). 	Short-term	Export Promotion Office
	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the industrial R&D co-financing mechanism to identify potential improvements. 		
	<ul style="list-style-type: none"> ✓ Relieve compliance requirements to increase the number of applicants and stimulate innovative activity. 		
<ul style="list-style-type: none"> • Policy tools do not fully address the need to raise awareness about and develop capacities to use regulation of national standards and certificates. 	<ul style="list-style-type: none"> ✓ Develop a promotional initiative to raise awareness about recent reforms in standards, testing and certification, in particular regional reforms. 	Short-term	Azerbaijani Institute of Standardization

Source: UNECE.

Sub-pillar V: Research and education

Recognizing the requirements of today's labour markets and rapidly evolving technological environment, governments have pursued a multidisciplinary approach to education through science, technology, engineering and mathematics (STEM) initiatives. Policy measures to enhance research are designed to promote research excellence, collaboration and commercialization.

Policies to increase the number of STEM graduates

The National Strategy for the Development of Education in Azerbaijan (2015–2025) recognizes the importance of STEM education and has led to a series of support initiatives over the past several years. In 2019, a STEM tournament, the First Lego League Azerbaijan 2019, was piloted for 10–15-year-old pupils across the country. A Digital Skills project that started in 2017 helps students develop algorithmic thinking and programming fundamentals. In addition, the STEAM project provides training for teachers in the field, addressing the growing demand for qualified teaching personnel. The Strategic Road Map for the Development of Vocational Education and Training (approved in 2016) further aims to improve the quality of technical and vocational training. The Azerbaijan Robotics Engineering Academy works with children and youth in a broad age range, from 4 to 25. The Robopark exhibition project, led by the MTCHT, aims to increase interest in robotics, develop distance learning and attract innovative projects to competitions. Within the project, the formation of an innovation cluster is envisaged for companies involved in robotics (such as the Academy). In addition, the World Robot Olympiad Azerbaijan adds to the support in the artificial intelligence field and increases students' interest in STEM education. As most STEM initiatives are concentrated in Baku, science, technology and innovation (STI) policy should ensure the simultaneous development of STEM education across the country.

Policies to foster research development

Most research is funded by the public sector. In 2017, Azerbaijan was home to 137 R&D organizations, 89 of them based in the ANAS and 6 affiliated with various ministries (Azerbaijan, State Statistical Committee, 2020a). The activities of the ANAS are financed from the State budget with ad hoc contributions of international funds for specific projects. The funding of branch R&D institutes within different ministries is part of the budgets of the respective ministries.

No nationwide action plan exists for research funding, and the level of involvement of private capital in R&D remains low – according to state statistical information, only 9 of the organizations that performed R&D in 2017 were private companies. Among the constraints to private sector engagement are insufficient funding and the lack of widely accessible information on the research infrastructure available. As a result, scientists and enterprises complain of a lack of access to modern R&D equipment, while modern research infrastructure often remains underused because of restrictive internal procedures at higher-education institutions (HEIs) that limit access by outside users.

One of the leading constraints is insufficient funding. According to data from the State Statistical Committee, the Government allocates approximately 0.6 per cent from the State budget each year for science-related expenses, which accounts for just 0.2 per cent of GDP. The principal source of funding for R&D is the State budget. In terms of expenditures, in 2017 the biggest share of finances allocated for R&D was spent by the state sector (represented mainly by the ANAS), HEIs and – by the smallest relative share – the private sector. An important channel for improving innovative ability is joint research projects, which facilitate technology spillovers. They also present more opportunities for cross-border research cooperation, an area with ample potential for innovative development that has yet to be fully explored.

Sub-pillar V IPO evaluation and recommendations

Achievements

- ✓ A widespread network of scientific laboratories has been established by the ANAS to support research activity.
- ✓ Recent efforts to improve the quality of STEM education complement existing support measures to improve education.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy support measures aimed at increasing the number of STEM students in the higher-education subsector need to be reinforced to complement existing policy efforts. 	<ul style="list-style-type: none"> ✓ Expand support for STEM education at HEIs (for example, State-funded places at universities, scholarships) and build on efforts to improve cross-border knowledge absorption (such as international exchange programmes in STEM-related fields). 	Short-term	Ministry of Education
<ul style="list-style-type: none"> • Policy support measures for nationwide research funding need to be strengthened further to incentivize innovative activity. 	<ul style="list-style-type: none"> ✓ Introduce competitive research-funding mechanisms to promote research that responds to market needs (for example, offer scholarships and grants in high-potential research fields, co-finance collaborative R&D projects). 	Medium-term	ANAS Innovation Agency
	<ul style="list-style-type: none"> ✓ Consolidate policy tools in a State programme for developing research, innovation, science and technology, to unify policy efforts and ensure efficient delivery. 		
<ul style="list-style-type: none"> • Policy tools do not fully exploit opportunities for cross-border research cooperation. 	<ul style="list-style-type: none"> ✓ Foster international collaborations in research by forming partnerships with foreign R&D institutes or better supporting existing partnerships with R&D activities. 	Short-term	ANAS
	<ul style="list-style-type: none"> ✓ Incentivize engagement with co-publications, to exchange knowledge and build research networks. 		
	<ul style="list-style-type: none"> ✓ Develop a programme of international study tours for capacity-building and mutual exchange of best practices. 	Short-term	Fund for Support to Azerbaijani Diaspora
	<ul style="list-style-type: none"> ✓ Consider integrating incentives for joint research collaboration into diaspora mobilization initiatives (for example, through support for co-publications). 	Short-term	Fund for Support to Azerbaijani Diaspora

Source: UNECE.

Notes

- ¹ I2B – From Idea to Business is a joint project of the MTCHT with the Regional Development Public Foundation of the Heydar Aliyev Foundation, the Youth Fund of the Republic of Azerbaijan, the United Nations Development Programme, and the Azercell and Microsoft companies.
- ² President of Azerbaijan, The Regulations of Innovation Agency under the Ministry of Transport, Communications and High Technologies of the Republic of Azerbaijan, 22 February 2019.

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State Agency for Public Service and Social Innovations – Azerbaijan Service and Assessment Network: <https://asan.gov.az/az>

Tax Code of the Republic of Azerbaijan: <https://www.taxes.gov.az/az/page/ar-vergi-mecellesi>

Chapter V

PILLAR III: INNOVATION POLICY PROCESSES

Pillar III examines the underlying processes for innovation policymaking: how data, evidence and stakeholder input inform how decisions are made, put into practice, monitored and evaluated, based on the experience from one specific policy. Ten detailed policy indicators address each step in the policy process of that specific policy, from problem identification or market failure to policy design, implementation, evaluation, impact assessment and learning.

In consultation with Azerbaijan's MTCHT, UNECE selected the Grant Scheme under the State Fund for Development of Information Technologies for assessment, on the basis of these criteria:

- i) The policy measure is intended to foster science, technology and innovation (STI) in the country.*
- ii) The policy measure reflects the standard innovation policy practices in the country.*

Pillar III also derives broader policy lessons for innovation policymaking.

Innovation policy processes – strengths and weaknesses

Azerbaijan launched major structural reforms in 2015 that included establishing the Centre for Economic Reforms and Communications, with the primary goal of developing economic reform proposals based on analytical data and efficient coordination between government bodies. In general, the top-down approach dominates all policymaking spheres in the country as the political environment is highly centralized. Evidence-based policymaking is not yet fully established, and the quality of the analysis supporting new policies and laws is relatively low. Azerbaijan has also made progress in developing electronic government and e-services in recent years. The development of e-government was envisioned in the State Programme for the Development of Communication and Information Technologies 2014–2020 and the Presidential Decree “On measures to

develop e-government and transition to the digital government” (14 March 2018). The main purpose of the programme is to provide good-quality, efficient and accessible services for citizens, based on the one-stop shop principle, and gradual development of the e-services and e-government applications in government institutions. The programme has also expanded the range of services provided by the ASAN and increased the number of its service centres.

Following the Decree on e-government, the E-GOV Development Centre, a legal public entity, was established under the State Agency for Public Service and Social Innovations. The Centre has become a coordinating body in charge of enforcing supervision of the formulation, implementation, integration and effective management of public information resources and systems, as well as promoting public awareness of services. The Government also opened a tier 3 data centre in 2019; its G-cloud will accelerate the transition to digital government and is expected to lead to more effective public administration. These developments are considered far-reaching in Azerbaijan, as they not only modernized service delivery and added to its transparency and efficiency, but also thereby changed the mindsets of civil servants and ordinary citizens, who believed that bureaucracy and corruption were firmly embedded within governmental structures.

Policy focus: grants programmes

Grant schemes are “non-reimbursable transfer[s] to project beneficiaries [...] based on a specific project rationale for particular purposes and on condition that the recipient makes a specified contribution for the same purpose or subproject” (IFAD, 2012, p. 8). As one-off payments, they differ from permanent public transfers such as social security or subsidies for inputs and services (IFAD, 2012). Grants are a form of direct subsidy to enterprises. In the innovation policy sphere, grants programmes usually aim to stimulate enterprise innovation and defray some of its risk by helping entrepreneurs meet the high financial costs of experimenting with new ideas.

Grant schemes require substantial budget resources and risk encouraging rent-seeking and market distortions. For these reasons, they should target a well-identified market failure, specific beneficiary groups that have a verified demand and the potential for additionality and spillovers (IBRD and World Bank, 2016). This is particularly true in countries with limited fiscal space and a strong need to maximize the impact of public spending, such as those in the EESC sub-region. Ideally, to avoid free-rider effects, resources for co-funding should be available for beneficiary firms.

Successful design and implementation of grant schemes (box V.1) requires time and resources, starting with the analytical underpinnings. Failure to take all the steps is likely to result in suboptimal outcomes, such as limited additionality and spillovers, weak demand and disbursements, and unintended consequences on the service provider market (such as a price increase if the supply is inelastic) (IBRD and World Bank, 2016).

Policy focus: the Grant Scheme

Azerbaijan’s Grant Scheme, which operated between 2012 and 2018, stimulated innovation and development in ICT, and provided financial assistance for applied scientific research in the field. It operated under the State Fund for Development of Information Technologies.

Box V.1 Success factors in designing and implementing grant schemes

A recent review of 106 World Bank–implemented grant schemes (IBRD and World Bank, 2016) identified several success factors in their design and implementation:

- Early presentation of the functionality of the scheme to stakeholders
- Provision of personalized technical assistance to beneficiaries
- Mitigation measures to avoid political capture
- Selection of service providers by beneficiaries
- Transparent selection criteria for beneficiaries
- A level of subsidy that makes the scheme attractive but does not diminish ownership
- Light-touch administrative procedures
- Effective marketing and promotion
- Continuous, transparent monitoring and evaluation so as to assess impact, reduce fraud and identify ways to improve

Established by Presidential Decree No. 2095 (15 March 2012), the State Fund itself operated under the MTCHT. The Fund provided financing through investment, low-interest loans and grants. The Grant Scheme focused on financing innovative and scientific-technical start-up projects.

The operational part of the Grant Scheme was structured through a well-laid-out manual, addressing eligibility criteria, selection criteria and application rules and describing the process and funding options. Nevertheless, the scheme faced a number of issues in preparation, design and implementation.

In all, the Fund disbursed AZN 1.59 million under the Grant Scheme. Distributed in six financing cycles across six years, the grants of AZN 10,000–300,000, in small, medium-sized and large categories, had no co-financing requirements for the beneficiaries. Projects could be financed for up to three years, and beneficiaries could spend the grants on costs that derived directly from organizing work in accordance with the business plans of their projects. A supervisory committee made the decisions on grant allocations.

After 2018, the Grant Scheme changed its focus from “ICT Innovations” to “Innovations Everywhere” to become more scalable and diversified under the operation of the new Innovation Agency of the MTCHT. That agency, which replaced the State Fund, is designing and implementing a new innovation grant scheme.

Table V.1 Overview of sub-pillars and indicators for innovation policy processes

Sub-pillar I: Preparation	Sub-pillar II: Design	Sub-pillar III: Implementation	Sub-pillar IV: Post-implementation
Innovation foresight	Planning	Amendment of policies	Ex-post evaluation
Policy rationale	Public-private consultation	Review of the policy against its action plan	Adaptation
	Policy coherence		

Source: UNECE.

Sub-pillar I: Preparation

Sound preparation of policies sets the foundation for the policymaking process. Public intervention should, where appropriate, depend on the identification of market failures as well as future trends that will affect the area of intervention.

Innovation foresight

Innovation foresight – the practice of capturing future trends and perspectives in research activities and adjusting innovation policies accordingly – is new in Azerbaijan and thus not yet integrated systematically and continuously into the innovation policymaking process, or into the processes for other policies. Foresight exercises were implemented for the first time in the 11 Strategic Road Maps for the National Economy and Main Economic Sectors, which included a detailed short-term action plan for 2017–2020, a long-term strategy for the period until 2025 and a vision for the post-2025 period. The lack of systematic forecasting indicates that measures such as the Grant Scheme may not have been grounded in agreed, realistic assumptions from which the key performance indicators (KPIs) follow, and that it may not be possible to monitor and evaluate impacts in a concerted fashion.

Policy rationale

No market failure analysis was conducted by the MCTHT. The rationale cited for the policy was to implement support for start-ups so as to form a start-up movement in the country. It was established to stimulate activity in the ICT sector and to expand the application of innovations in this field as well as applied research. Limited access to external finance presents a barrier to all types of SMEs in Azerbaijan. According to a 2015 World Bank survey, 51 per cent of SMEs consider limited access to finance the biggest obstacle to doing business in Azerbaijan (World Bank, 2015).¹ The 2018 OECD enterprise survey of Azerbaijani SMEs found that a large majority (76 per cent) of respondents consider internal funds their most important source of financing, while 58 per cent considered insufficient access to finance a barrier to their growth (OECD, 2018). Another significant challenge for innovative SMEs is the lack of regulations related to venture capital and angel funding.

The most common type of analysis conducted within the policy process in Azerbaijan generally is the strengths-weaknesses-opportunities-threats (SWOT) analysis; computer simulations, market failure analyses and econometric analyses are rare. For example, in 2018 a SWOT analysis was conducted as part of the “Building a Knowledge Economy in Azerbaijan” project (UNDP, 2018).

Broader policy issues

The Constitutional Law of the Republic of Azerbaijan on Regulatory Legal Acts (Azerbaijan, President, 2011) regulates the procedure for submitting draft normative legal acts to the relevant regulatory bodies. It stipulates that all such acts should include a letter justifying the necessity of adoption, with financial and economic validation; documents reflecting

the agreement of the draft act; expert opinions on the draft; a list of the people who drafted it and related documents selected by the submitter. The level of policy analysis underlying this information is generally basic, in particular that of the accompanying letter.

In addition, all draft normative legislative acts must pass a compulsory legal review. The inspection includes analysis of the status of regulations in the field (specific acts in force); the compliance of the draft act with its goals and objectives; the rationale for the internal structure of the act; the exclusion of mutual inconsistency of the norms in the draft act; the presence of abuse factors or any provisions that may create conditions for abuse; and a list of the normative legal acts (or their structural elements) that must be cancelled or amended following the adoption of the draft act. The Cabinet of Ministers has issued guidelines on how to conduct regulatory impact assessment (RIA) (Azerbaijan, Cabinet of Ministers, 2016). But the document covers only the regulation of issuance of licenses and permits; it does not address other aspects of policy.

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Policymakers have started to apply foresight exercises in preparing policies. ✓ SWOT analyses are the most common type of analysis conducted in preparing policy. <ul style="list-style-type: none"> ✓ A legal framework with requirements for preparing policy is in place. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Innovation foresight is not yet integrated systematically; it tends to be done ad hoc and tied to specific policy design efforts. 	<ul style="list-style-type: none"> ✓ Integrate innovation foresight practices into the policy processes of relevant line ministries to capture future trends in and perspectives on research activities for incorporation in the long-term strategic direction of innovation development. 	Medium-term	MTCHT
<ul style="list-style-type: none"> • Evidence-based policymaking is not yet fully established, and the quality of the analysis supporting new policies and laws is relatively low. 	<ul style="list-style-type: none"> ✓ Build on efforts and experiences with RIAs by creating a timeline and plan to institutionalize and implement RIAs more broadly, to ensure that drafters use evidence-based policymaking systematically when creating policies and laws. 	Medium-term	Cabinet of Ministers

Source: UNECE.

Sub-pillar II: Design

Public-private consultations are an integral part of the policy design process, to ensure policy relevance to the market and private sector needs and to confirm the commitment of relevant stakeholders to its implementation. Innovation policy is a supplementary component of a country's overarching strategy that contributes to the achievement of broader vision and objectives of socioeconomic development. Its priorities and activities should be consistent and coherent with relevant "non-innovation" policies.

Planning

Overall, the Grant Scheme seemed to aim at achieving a strong uptake of the scheme. The grants were relatively large and there were no co-financing requirements, in common with the practice in other countries for projects with high additionality or significant spillover potential (IFAD, 2012). Furthermore, despite the limited fiscal space of the Government, the State Fund for Development of Information Technologies did not require an equity stake for itself in beneficiary companies. The committee that selected beneficiaries did not include international experts, although this would have been a good practice.

The focus on uptake by default reduced the focus on innovation and potential return. The Grant Scheme's focus on social return was low. There was no evidence of a systematic effort to vet projects from the perspective of sustainable development, to make sure they do no harm and to give preference to those likely to make a strong contribution if successful. Nonetheless, attention was paid to the contribution of the projects to the development of the ICT sector.

Public-private consultation mechanisms

The Law on Public Participation, which entered into force in 2014, provides the legal basis for public councils, hearings and consultations, written consultations through the internet, and public consultations on draft legislation to be organized by the Parliament. The Parliament places draft laws and other legislative acts online and provides an opportunity for feedback but not for discussion. International assessments consider these provisions insufficient – minutes from parliamentary meetings, for example, are not published in a timely manner and advanced degrees of public participation at the parliamentary meetings, including committees, are virtually non-existent; comments can be made on draft laws through the parliamentary website but no information exists about whether they are taken on board (Council of Europe, 2017).

Decree No. 142 of the Cabinet of Ministers (25 June 2012) introduced the "Rules for placing draft normative legal acts developed by the Cabinet of Ministers and central executive bodies on the e-Government portal". The main purpose was to regulate public and professional discussion through the online platform before the projects

are submitted for approval. Anyone wishing to participate in the project discussion must register and acquire an electronic signature on the portal. That said, this section of the website does not appear to be updated regularly, as the last draft normative act on it dates back to 2018. Also, it has no features to show what suggestions, if any, have been proposed and whether they have been considered.

The National Confederation of Entrepreneurs represents small and large businesses across a wide range of economic sectors as well as a number of business associations. It works closely with public institutions and organizes public hearings, discussions and roundtables on business-related topics, including the legislative process, with the participation of the business community. The Confederation is invited to attend Parliamentary commissions to comment on business-related legislation. The Confederation also hosts discussions and forums organized by civil society organizations, such as the Entrepreneurship Development Foundation, on business environment and legislative initiatives. No civil society organizations represent the interests of innovative SMEs.

Despite these consultative efforts, there is no systematic information on and no centralized website for ongoing and past public-private consultations and their outcomes. Public-private consultations are still conducted ad hoc, rather than in a systematic and planned manner. There is no detailed information about consultations in which SMEs participate. A 2017 Council of Europe assessment raised concern about the degree of information available to the public about activities and decision-making by authorities who treat their activities as confidential information and are often secretive about the agenda and decision-making process in government agencies, with NGOs lacking access to the decision-making process. Furthermore, information provided to civil society is rudimentary, especially before a final government decision is adopted.

Policy coherence

The Grant Scheme was coherent with the National Strategy for the Development of the Information Society. One of the measures in the strategy was support of start-up projects on ICT and high technology in order to create an innovation system that ensures the development of high-tech products.

Broader policy issues

The analysis found no evidence of systematic efforts to train civil servants to draft policy in ministries responsible for STI policies. Capacity-building for civil servants is offered at the Academy of Public Administration, through which mid-level civil servants can take short-term courses or a two-year course that leads to a master's degree. The National Strategy on Development of Civil Services, adopted in 2018, envisions developing training modules and programs for civil service executives. It also sets up the following targets: (1) assessment of civil servants' training needs, (2) preparation of proposals on training strategies, (3) preparation of proposals on improving the activity of the Academy of Public Administration in professional development of civil servants and (4) preparation of proposals for coordinating the activities of the training centres of the state bodies.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ The Grant Scheme was coherent with the objectives of the National Strategy for the Development of the Information Society.
- ✓ The Law on Public Participation provides a legal basis for public councils, hearings and consultations, written consultations on the internet, and public consultations on draft legislation, organized by the Parliament.
- ✓ A Decree of the Cabinet of Ministers regulates public and professional discussions through an online platform.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Despite the limited fiscal space in Azerbaijan, the State Fund did not require an equity stake in beneficiary companies. 	<ul style="list-style-type: none"> ✓ Integrate mechanisms for the Innovation Agency to hold equity in beneficiaries' projects in future grant schemes, to augment the financial return on investment of public resources; refer to practices in other EESC countries, which have tried relatively simple mechanisms that do not disrupt entrepreneurs' operations. 	Short-term	Innovation Agency
<ul style="list-style-type: none"> • The Grant Scheme had no co-financing requirements for beneficiaries. 	<ul style="list-style-type: none"> ✓ Introduce co-financing requirements in future grant schemes. Evidence suggests "that the higher the subsidy, the lower the likely long-term impact as a proportion of the subsidy cost, as it may lead to 'adverse selection' of initial participants, who are unlikely to be able to purchase the service at full cost" (IBRD and World Bank, 2016, p. 49). 	Short-term	Innovation Agency
<ul style="list-style-type: none"> • The Grant Scheme focused too little on social returns. 	<ul style="list-style-type: none"> ✓ Enhance efforts and mechanisms to further mainstream the three pillars of sustainable development across Innovation Agency policies and processes, by targeting explicit sustainability criteria to the eligibility of applicants for future grant schemes. These criteria could relate to gender or to subnational development issues, for example, or other priorities for the Government. 	Short-term	Innovation Agency
<ul style="list-style-type: none"> • Across ministries, there is no systematic practice of consulting the public on new policy proposals. 	<ul style="list-style-type: none"> ✓ Develop and pilot a concerted approach in line ministries to consultations with the private sector and the broader public on policy design and implementation, as part of the regular policy cycle and decision-making processes. 	Short-term	MTCHT

Source: UNECE.

Sub-pillar III: Implementation

Targets and time frames defined in the action plan provide a basis for regular reviews of implementation progress. Analysis of intermediate progress helps identify administrative, institutional and technical challenges faced during implementation and makes it possible to undertake necessary measures, including adjusting activity and reallocating resources.

Amendments of policies

Based on the transformation from the “ICT Innovations” to the “Innovations Everywhere” approach, the Innovation Agency was established on 6 November 2018, to replace the State Fund for Development of Information Technologies. The aim was to focus on innovation holistically, rather than only on the ICT sector.

Review of the policy against its action plan

Numerous interministerial working groups and sub-working groups exist, organized by the targets set in the 11 Road Maps of the Government. In accordance with the procedure established by the coordinating agency – the Centre for Analysis of Economic Reforms and Communication – each working group prepares and approves its yearly plan with the coordinating agency. Each group has an executive organization (a ministry or agency) that bears primary responsibility for achieving the set target. The working groups meet quarterly and submit to the coordinating agency a report about implemented activities within 10 days of the meeting. On the basis of this data, the Centre prepares an annual report.² BP Azerbaijan has allocated funding for modernizing the electronic monitoring and evaluation infrastructure of the Centre to enable it to process effectively the information on implementing Strategic Road Maps from 47 State bodies.

Nine working groups have been established to improve the standing of Azerbaijan in international business rankings. One is dedicated to technology and innovation (Azerbaijan, Commission on Business Environment and International Rankings, 2019). It operates under the leadership of the State Agency for Citizens Service and Social Innovation. The MTCHT participates in a form of public-private partnership (of nine members, two are representatives of the business community – PwC Azerbaijan and Ernst & Young Azerbaijan). This working group has an annual action plan structured on indicators related to ICT and innovation as reflected in international rankings (Azerbaijan, Deputy Prime Minister, 2019).

The Presidential Decree “On coordination in the field of innovative development” (10 January 2019) identifies entities involved in coordination: the ANAS, executive authorities established by the President and public institutions, including State HEIs, State-owned legal persons and business entities whose shares (stocks) are controlled by the State form a coordination council. These entities submit to the Presidential Administration semi-annual reports about the work done in supporting innovative development,

including start-up activities. Yet, to date the work of the coordinating council has not been formalized. According to the MTCHT, as of March 2020 two interministerial group meetings had been conducted under the lead of the Assistant to the President on Innovations.

Broader policy issues

The analysis revealed some limitations in the implementation of the Grant Scheme. First, although the State Fund had not previously implemented an ICT grants scheme, it made no systematic training efforts to prepare staff to coordinate and implement the scheme. Adequate staff training is an important success factor in the ability of agencies to implement grants schemes (IBRD and World Bank, 2016, p. 3), particularly when no experience with such schemes exists. Second, the measures in place to prevent fraud by grant beneficiaries were not evident. Third, the Grant Scheme gave no consideration to sustainability. These limitations should be corrected in future grant schemes.

Sub-pillar III		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Implementation of the Grant Scheme underwent six yearly financing rounds as planned. ✓ The operational part of the Grant Scheme was supported by a project manual and a structured selection process. ✓ The Government has adjusted its approach to grants schemes, with a more holistic approach to innovation. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Staff received no specific training on implementing grant schemes. 	<ul style="list-style-type: none"> ✓ Introduce targeted training schemes for Innovation Agency staff, when a policy measure is introduced or revamped. 	Short-term	Innovation Agency
<ul style="list-style-type: none"> • Measures in place to prevent fraud by grant beneficiaries were not evident. 	<ul style="list-style-type: none"> ✓ Bolster the Innovation Agency's anti-fraud measures, including audits of projects, public disclosure of fraudulent behaviour and structured field visits for future grants schemes – particularly those with no or very low co-financing requirements. 	Short-term	Innovation Agency

Source: UNECE.

Sub-pillar IV: Post-implementation

Ex-post evaluation is completed after the implementation of the action plan and based on results rather than forecasts. It helps establish the impact of policy activities on the industry in general, on specific fields or on beneficiaries. In light of experience acquired during implementation, governments introduce necessary adjustments to innovation policy measures so as to better target new or established policy objectives.

Ex-post evaluation

Policy monitoring in Azerbaijan is usually conducted by focusing on implemented activities but not the results. This was the case with the Grant Scheme: at the end of each year, the State Fund reported on the number of grant competitions, the number of projects in the competitions, the winners and the state of their funding. During grant financing, all start-up projects were monitored in order to assess the implementation of the project contractor's obligations. A recent OECD report describes the process of monitoring the Strategic Road Maps as needing to improve the relevance of its KPIs, as many are not measurable, others are not specific to the assigned actions and others are driven more by the activity of large firms than that of SMEs (OECD, 2017).

Broader policy issues

Overall, monitoring and evaluation in Azerbaijan's government is insufficient, superficial, haphazard and overly focussed on outputs, with few systemic linkages to ensure that learning feeds into the policy design process, including in government bodies responsible for STI policy. The IPO found only limited evidence of any type of impact assessment of innovation policies across relevant ministries, including the Grant Scheme.

Sub-pillar IV IPO evaluation and recommendations

Achievements			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Monitoring and evaluation in the Government is insufficient and overly focussed on outputs, with few systemic linkages to ensure that learning feeds into policy design. 	<ul style="list-style-type: none"> ✓ Implement RIA systematically, to enhance the quality of the flow and stock of laws and policies, given the scarcity of monitoring, evaluation and impact assessment practices in the policymaking process. 	Medium-term	Line ministries
<ul style="list-style-type: none"> The Grant Scheme lacked an impact assessment. 	<ul style="list-style-type: none"> ✓ For future grant schemes, ensure the independence of impact assessments, ideally by having an external, independent assessor conduct them, rather than internal staff. 	Short-term	Innovation Agency
<ul style="list-style-type: none"> Monitoring and evaluation have only a tenuous link with future policy design. 	<ul style="list-style-type: none"> ✓ Establish a more systemic linkage of monitoring and evaluation to policy design, including in government bodies responsible for STI policy. 	Medium-term	Line ministries and implementation agencies

Source: UNECE.

Notes

- ¹ World Bank, Access to finance – essential for job creation and diversified growth in Azerbaijan, 12 May 2015.
- ² The latest report, from January 2019, focuses on the results of 2018 (Centre for Analysis of Economic Reforms and Communication, 2019).

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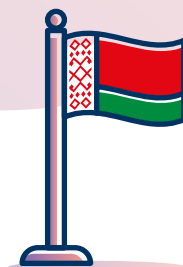
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BELARUS



Chapter I

ECONOMIC OVERVIEW

General overview

Belarus is an export-oriented country in Eastern Europe neighbouring and with strong historical ties to the Russian Federation, the Baltics, Poland and Ukraine. It retained much of its diversified production structure following independence from the Soviet Union, through a significantly slower and more gradual transition to a market economy. The past “golden” decade has seen stable growth and an expanding, export-oriented information and communication technology (ICT) services sector, fuelled in part by reforms that increased openness and macroeconomic stability. The private sector, especially in regard to innovation, is hamstrung by the dominance of State-owned assets, burdensome regulations and ambitious but at times inefficient support mechanisms. Boosting broader experimentation with ideas to create value and increase productivity will be essential for Belarus to sustain growth in the medium and long term.

Reform process

Following the dissolution of the Soviet Union, in contrast to many post-Soviet states, Belarus took a cautious, gradual approach to the transition from a planned to a market economy. This has included modest structural reforms, mainly concentrated in restructuring, rather than offloading. With little progress on privatization, State-owned enterprises (SOEs) (box I.1) have inhibited the development of the private sector as a potential driver for growth and continue to impede productivity (World Bank, 2018). Belarus ranked 49th of 190 economies in the 2020 *Doing Business* indicators, after moving up 42 positions since 2010 (when it ranked 91st), a reflection of concerted efforts to streamline administrative procedures. It lags far behind in several areas particularly important for promoting innovation, such as credit and equity capital and insolvency resolution.

GDP growth

GDP growth, at 3.1 per cent in 2018, declined to 1.2 per cent in 2019; the ICT sector alone contributed 0.5 percentage points, the same amount as the combined contribution of the agriculture, transport and industry sectors.¹ The country’s strong relationship with the Russian Federation has ensured below-market energy supplies, government revenue from reselling and sustainable access to credit, fuelling growth and productivity. Recent reforms have stabilized the currency and reduced inflation, increased macroeconomic stability, simplified some areas of regulation and increased openness to trade and investment

(figure I.1). GDP per capita (current international US dollars) has been rising, from \$5,023 in 2016 to \$6,663 in 2019. National incomes have risen steadily, driving consumption, and GDP per capita based on purchasing power parity (current international US dollars) increased from \$17,726 in 2016 to \$19,943 in 2019, the highest in the Eastern Europe and the South Caucasus (EESC) sub-region (World Bank, 2020a).

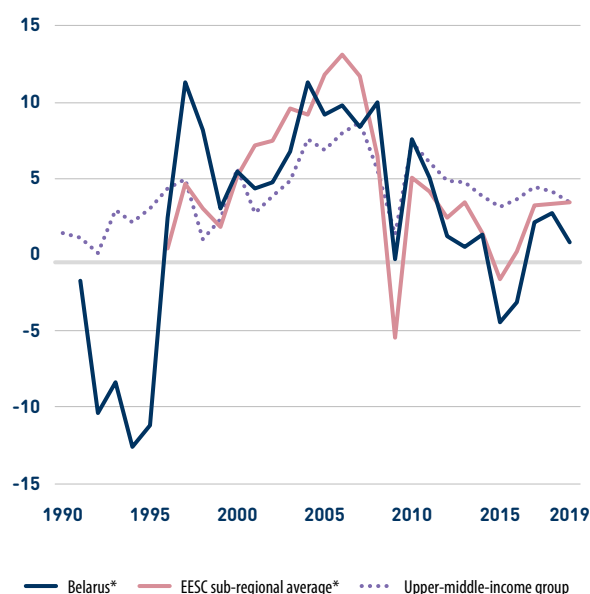
Despite having recovered from a two-year decline, the Belarusian economy remains vulnerable to external shocks while SOE debt remains high. It still made up 14 per cent of GDP in 2019. Gross capital formation in Belarus in 2019 was almost 29 per cent of GDP, the highest in the EESC sub-region, ahead of Georgia (27 per cent). Nonetheless, new and sustainable drivers of growth will be needed to compensate for diminished returns. Belarus recorded the lowest share of remittances in the EESC sub-region, amounting to 2.3 per cent of GDP in 2019 (World Bank, 2020a), and labour productivity has slowed since 2010, weakening growth in real income, pensions and wages.

The ratio of government expenditure to GDP has been declining since 2015 but remained above 35 per cent in 2018, whereas public debt grew to 36.7 per cent of GDP that year, further constraining fiscal space. A recent increase in the current account deficit to 1.8 per cent of GDP in 2019 – mainly caused by the recent decrease in merchandise exports and tensions in energy relations with the Russian Federation, resulting in lower energy subsidies (energy taxes) – is straining the economy and intensifying the need to enhance productivity.² If not addressed, lack of productivity in combination with the country's vulnerability to external shocks may significantly impede further growth of the economy.

Foreign direct investment

Foreign direct investment (FDI) in Belarus has maintained a steady share of GDP over the past decade, accounting for 2.02 per cent in 2019 (World Bank, 2020a), slightly higher than in Armenia (1.86 per cent) or in Ukraine (1.98 per cent). Efforts have been made to protect investors and attract efficiency-seeking FDI. In addition to seven free economic zones, Belarus has constructed the High-Tech Park (HTP) and the Great Stone Industrial Park (GSIP) (in partnership with China), providing a preferential tax system among other benefits (chapter IV). Nonetheless, SOEs receive a substantial share of capital investment (box I.1), which they use much less effectively than does the private sector (World Bank, 2018). As government revenue decreases further, including through the impact of pandemic-related restrictions and falling global demand, the need to allocate systematically – to allocate resources to better use – will grow more pronounced. The vehicle for this, of course, is broad experimentation with new ideas, mostly through the nascent but hamstrung private sector.

Figure I.1 • Annual GDP growth, 1990–2019 (Per cent)



Source: UNECE, based on data from the World Bank (2020a).

*Missing data for the Republic of Moldova (1990–1995); Belarus, Armenia, Azerbaijan and Belarus (1990).

Box I.1 State-owned enterprises

The share of SOEs in Belarus is significantly high than in other transition economies. Specifically, in 2019, 12.4 per cent of firms were either fully or partially State-owned. They owned 67.6 per cent of overall fixed assets in 2016 and employed approximately 56.7 per cent of the labour force in 2018, though their value added to revenue was only a third of that of private firms. Despite preferential treatment, such as better access to (in)direct financial support from the Government, the competitive performance of SOEs is inhibited by structural weaknesses and inefficient corporate governance.

Source: IMF (2017), Belstat (2019).

Sectoral composition

The country remains the most diversified economy in the EESC sub-region with developed, largely export-oriented industry; several pockets of high value added production; and a solid tradition and institutional basis for advanced applied research, maintained from the Soviet era. Since the 1990s agricultural production has plummeted, accounting for barely 6.4 per cent of GDP in 2018, and nearly 60 per cent of agricultural production is concentrated in highly subsidized State-owned farms, a legacy of the Soviet Union's agriculture policy (World Bank, 2018). Nevertheless, Belarus remains the third largest producer of rye and flax fibre globally. Services accounted for 47.7 per cent of GDP in 2018, followed by manufacturing (21.5 per cent), mainly driven by the manufacture of food products and refined petroleum (World Bank, 2020b). Although the petroleum sector is riddled with inefficient SOEs (IMF, 2017), the modest scale of reform efforts in this sector continues to prevent the further diversification of the economy.

Demographics

The population growth rate in Belarus between 1994 and 2013 was consistently negative, with values between 0 and -1 per cent. The rate increased to a peak in 2015 (0.159 per cent), but in 2018 again turned negative, at -0.16 per cent (World Bank, 2020a). Although outmigration has remained relatively low, between 1991 and 2018 the share of the rural population declined consistently, from 33.6 per cent to 21.4 per cent. Unemployment has been declining since 2017 and was at 4.6 per cent of the total labour force (modelled estimate from the International Labour Organization (ILO)) in 2019, the lowest in the region (World Bank, 2020).

External position

The economy is highly export-oriented, with total trade at 139.34 per cent of GDP (World Bank, 2020b) and a diversified export structure. Belarus is a member of the Eurasian Economic Union along with the Russian Federation, Kazakhstan, Armenia and Kyrgyzstan.

In addition, foreign trade potential is being explored with more distant country partners – the GSIP is a free economic zone, part of the New Silk Road project with China. Following the accession of Belarus to the World Trade Organization (WTO) in 1993, the country initiated a bilateral Partnership and Cooperation Agreement with the European Union (EU) in 1995; it has yet to be ratified.³ The largest potential for the economy is in the country's diversified, export-oriented manufacturing sector, specifically in mechanical engineering, metallurgy, pharmaceuticals and electronics. Demand for ICT services exports has experienced significant growth and, next to transportation services, has been one of the main drivers of overall services exports (chapter II) (EY, 2017). In 2018, the products exported from the country were led by refined petroleum (19.7 per cent), potassic fertilizers (8.28 per cent) and delivery trucks (4.59 per cent), with the rest distributed across the HS2 categories of animal products, metals, machines, plastics and rubbers, wood products and textiles. Belarusian production depends highly on the Russian market, the destination for over 90 per cent of its agricultural exports and 38 per cent of its merchandise exports (OEC, 2020). Belarus enjoys revealed comparative advantages (RCAs)⁴ across several product groups, such as machinery and transport equipment, crude materials and mineral fuels, as well as chemicals and related products (UNCTADstat, 2020). In line with this distribution, in 2018 the index of merchandise concentration for exports showed a value of 0.18, which makes the country's exports the second most diversified in the EESC sub-region, after Ukraine (0.14)⁵ (UNCTADstat, 2020).

On the 2020 Competitive Industrial Performance (CIP) Index, Belarus scored highest among the EESC countries (0.063), ranking 47th out of 152 countries and confirming the high contribution of manufacturing to the national economy (UNIDO, 2020).

Institutional quality

Belarus scored –0.7 for institutional quality, below the EESC sub-regional average of –0.3, as proxied by an average of World Governance Indicators. This average score indicates weak performance on the rule of law, control of corruption, government effectiveness, and voice and accountability. This score reflects the gradual approach to the market economy transition that Belarus has taken and the overall emphasis on government control of the economy. In many ways this approach has served the country well. As the importance of innovation for the sustainable development of the economy grows overall, it discourages and raises the cost of capital for entrepreneurship in general – and risk-taking experimentation in particular, reflecting a systemic constraint on innovation.

Sustainable development

Belarus has significantly reduced poverty, with 5.6 per cent of its population living below the national poverty line in 2018 (down from 41.9 per cent in 2000). Nonetheless, certain challenges remain. The inequality in household income between the richest and poorest regions of Belarus remains substantially high due to the differences in opportunities available in certain regions (World Bank, 2018).⁶

A strength of Belarus is the female tertiary enrolment rate, which was as high as 95 per cent in 2018 (gross), compared with the lower rate of male enrolment, at 80 per cent. That said, significant discrepancies remain, as the labour-force participation rate (modelled ILO estimate) started declining from 58.8 per cent in 2016 to 57.7 per cent in 2019. It remained substantially lower than for men (71.8 per cent) in 2019. The lack of institutional support of women (OECD, 2015) thus leaves female entrepreneurship a largely untapped resource. There is significant underused potential to make better use of the human capital of women, especially after having invested in their education.

Despite some efforts, environmental sustainability remains a challenge. Following energy disputes with the Russian Federation, Belarus commissioned the construction of a nuclear power plant in Astravets, to be finalized in 2020. Nonetheless, challenges remain in sustainable agriculture, waste management, water pollution and public environmental awareness (UNDAF, 2015). According to the 2019 Global Innovation Index (GII), Belarus ranks 99th with regard to GDP per unit of energy use, both a country and an income-group weakness (Cornell University, INSEAD and WIPO, 2019).

Synthesis

This table presents the main achievements of and challenges for the economic development of Belarus, based on the findings described in this chapter.

Progress made so far

- Facilitated doing business through simplified regulatory procedures
- Diversified exports with high value added manufacturing and services
- Strong industrial development in various sectors of the economy
- Reduced poverty and gender inequality over the past decade
- Enhanced growth of ICT service exports

Challenges ahead

- Expand structural and SOE reforms for a successful transition to a market economy.
- Increase international trade openness to reap the benefits of high value added production.
- Enhance labour productivity and competition on the domestic market to retain income growth.
- Foster, through careful and efficient use of government resources, private sector development to enable increased export diversification and innovation.

Source: UNECE.

Notes

- ¹ World Bank, The World Bank in Belarus, *Economic Overview*, 30 June 2020.
- ² World Bank, The World Bank in Belarus, *Economic Overview*, 30 June 2020.
- ³ EC (European Commission), Trade Policy Belarus, 11 June 2020.
- ⁴ The RCA database, created by UNCTADstat, measures trade patterns between countries based on their relative productivity. It does not take into account national trade measures, such as subsidies and (non-)tariff regulations.
- ⁵ In a range between 0 and 1, a value closer to 0 indicates higher levels of export diversification.
- ⁶ World Bank, In Belarus, inequality between regions requires new policy approach, says World Bank report, 25 September 2018.

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Chapter II

INNOVATION PERFORMANCE OVERVIEW

Innovation climate

Belarus has significant potential for innovation and innovation-driven economic development. It has a highly educated population and a skilled workforce, a strong tradition of fundamental and applied research in several important fields, and a relatively diversified economy with a strong international position in ICT and pockets of excellence in manufacturing. These are remarkable achievements because the overall business environment is still not particularly supportive of innovation and does not sufficiently encourage experimentation and risk taking, particularly in the private sector. As a result, the country's investments in education and research have so far not resulted in as much innovation as they might, and there is significant room for policy reforms to improve the business and innovation climate so that Belarus can reach its full potential.

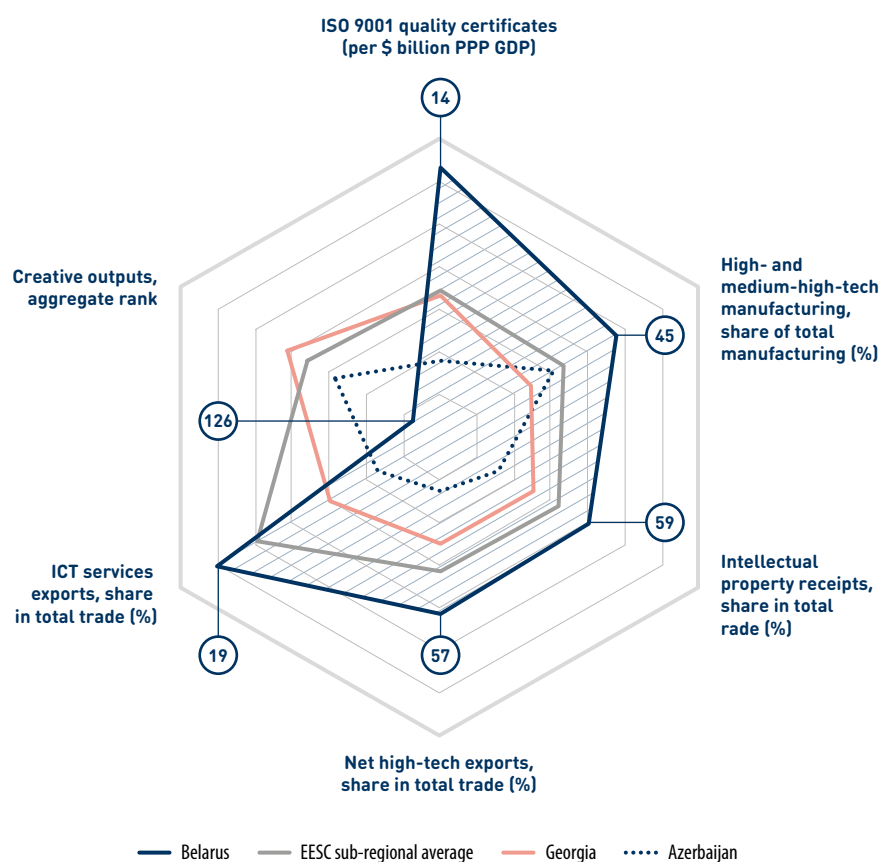
Innovation outcomes

Belarus is ranked 72nd out of 129 economies in the 2019 GII (Cornell University, INSEAD and WIPO, 2019) and 19th among 34 upper-middle-income countries. Although its overall innovation performance is in line with its current level of development, that is still well below its 2015 rank (53rd), signalling that the economy has not improved at the same rate as its peers in the innovation sphere. Figure II.1 on the following page depicts the Belarusian innovation performance in selected output indicators, as ranked globally in the 2019 GII.

Overall, the country performs relatively well in terms of key innovation outputs, exceeding the EESC sub-regional average in five of the six categories. Belarus ranked among the global leaders in quality certificates from the International Standards Organization (ISO) (at 14th), outperforming by far the rest of the EESC countries (22.2 per \$1 billion in purchasing power parity of GDP, as opposed to 1.2 in Azerbaijan and 3.3 in Georgia, for example). This reflects the country's skilled workforce and its tradition of applied research, which enable Belarusian companies to meet international quality standards – a key prerequisite for upgrading technology, competing in foreign markets and entering international value chains.

Another area where the innovation performance of Belarus stands out is in the ICT sector. Over the past decade, the ICT sector experienced rapid growth, nearly doubling its share

Figure II.1 • Innovation performance by selected GII indicators, 2019 ranks



Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).

Note: Lower values signify stronger performance.

of GDP (to approximately 5 per cent in 2017) and accounting for a significant share of intellectual property registrations (World Bank, 2018a). ICT service exports surged from 8 per cent (2010) to 18.4 per cent (2017) of total service exports, ranking the country 19th worldwide (EY, 2017). According to UNCTAD data, the share of ICT goods in total trade also increased, reaching 0.75 per cent in 2018 (from 0.52 per cent in 2015) (UNCTADstat, 2020). Belarus is ranked 32nd in the ICT Development Index, published by the International Telecommunication Union, and is considered one of the countries with good ICT infrastructure, comparing well with others across the EESC sub-region and beyond. Indeed, the number of fixed broadband subscriptions per 100 people is higher in Belarus (approximately 34 in 2018) than in Armenia (12) and Azerbaijan (19) and higher than the upper-middle-income group average (22) (World Bank, 2018a). In terms of computer software spending, however, Belarus ranked 107th in the GII, revealing that organizations place higher priority on replacing outdated equipment than on investing in software process innovation. In 2018 the highest share of ICT expenditure went to computing machinery and office equipment (24.6 per cent), followed by ICT-related services of other organizations and specialists (22.7 per cent), whereas software took up 19.3 per cent.

Belarus also has the highest share of high-tech and medium-high-tech manufacturing in total manufacturing (approximately 30 per cent) in the sub-region, and the second highest share of high-tech exports (1.8 per cent of total trade, behind only Ukraine), and scored above average on intellectual property receipts (revenues from selling or licensing Belarusian intellectual property abroad).

The National Statistical Committee of Belarus (Belstat) collects data on enterprise innovation activity every year, allowing for analysis and identification of market needs, innovation gaps and areas of competitive advantage. In 2019, 24.5 per cent of the industrial organizations surveyed (405 firms) were considered active in innovation, an increase in both share (from 15.4 per cent in 2010) and absolute number (from 324 firms in 2010) (Belstat, 2020). Although it is commendable that Belstat conducts national surveys of enterprise-level innovation activity, an expansion of the indicators measured would serve well to identify non-technological innovation trends.

The innovation output indicator on which Belarus does not perform well is creative outputs, with one of the lowest ranks in the world (126th). Although several indicators in its composite score bring its position down, including national feature films (105th), printing and other media as a percentage of manufacturing output (90th), and generic top-level domains (83rd), the main reason behind its low global positioning is lack of data on the other indicators – entertainment and media market, ICT and business model creation, and ICT and organizational model creation.

Innovation activity – channels, strengths and weaknesses

A key policy issue for Belarus is the innovation performance of the private sector, and particularly of small and medium enterprises (SMEs). Innovative, high-growth enterprises can be key drivers of overall innovation, and economic growth, competitiveness and sustainability.¹ Innovation across the SME sector, however, is modest – only 3.48 per cent of SMEs introduced product or process innovations in 2018, while barely 0.76 per cent introduced marketing or organizational innovations. The OECD's Project Report (2017) found that Belarusian SMEs operate on very small scales, mostly in non-innovative, low-productivity industries, which explains their limited contribution to total value added (OECD, 2017). Indeed, innovation is not a driving force in sectoral development, with the exception of a few, such as machine building and metallurgy.

Strong sectoral synergies can be a key driver of product development and knowledge transfer; however, in Belarus those synergies are weak: between 2015 and 2018 less than 0.5 per cent of SMEs collaborated with other SMEs (Belstat, 2020). In addition, with scarce venture capital and rigid support frameworks, the impediments to attaining long-term finance remain a significant constraint on the efficiency and growth of innovative SMEs (chapter IV) (EBRD, 2016).

International knowledge transfer

Innovation dynamics in Belarus, as in other post-Soviet transition economies, significantly depend on absorbing new technology and research and development (R&D) spillovers

from abroad. The aggregate score on knowledge absorption ranked Belarus 101/129 in 2019, and the economy exhibited modest performance in inward FDI (chapter I). Hrechyshkina and Samakhavets (2018) suggest that although FDI is an important driver of investment by Belarus in innovation, the fluctuations of FDI investment inhibit the full exploitation of the country's innovation potential. They further highlight the importance of securing a stable flow of FDI for the innovative development of Belarus. Inward foreign investment concentrates mainly in the Minsk region (over 69 per cent), with trade and transport activities proving most attractive for foreign investors. In the 2019 GII, Belarus ranked 109th on high-tech imports, which accounted for barely 5.1 per cent of total trade, constraining further improvements of intermediary inputs and production processes, and thereby new and improved final products.

Investment in R&D

Gross expenditure on R&D in Belarus accounted for 0.6 per cent of GDP in 2018, the highest share among the EESC countries (World Bank, 2020). The country ranked 29th in the 2019 GII, with 43 per cent of gross expenditure on R&D financed by businesses and 14.1 per cent sourced from abroad (Cornell University, INSEAD and WIPO, 2019). Nevertheless, R&D investment is still low when compared with the upper-middle-income group average (1.6 per cent in 2017) (World Bank, 2018a) – and there is no sign that Belarus is narrowing this gap.

In 2018, only 12 per cent of the expenditure on technological innovations went to R&D for new products, services and processes, while 23 per cent went to industrial designs and other pre-production activities, and 65 per cent to the acquisition of machinery and equipment related to technological innovation (Belstat, 2020). This suggests that innovation in Belarus to a large extent concentrates on modernizing machinery and using new equipment effectively yet lacks broader knowledge-intensive activities.

Most R&D is conducted in State-owned organizations that focus predominantly on technical sciences. To capitalize on its innovation capacities, Belarus needs to improve its enabling business environment and improve the ability of the business sector to absorb knowledge and apply it to innovating.

Skills development

A principal strength of the Belarusian economy for innovative development is its abundant capabilities in both human capital and research. In 2019, 86.7 per cent of the eligible population was enrolled in tertiary education, of which 33.2 per cent were graduates in science and engineering (ranked 6th globally). The 2019 Quacquarelli Symonds university ranking includes two of the country's higher-educational institutions (HEIs). Despite the high enrolment rates, however, a slight decline since 2013 (from 93.5 per cent) (World Bank, 2018a) suggests a mismatch between the current education supply and labour-market demand.

Some 39.2 per cent of the labour force is employed in knowledge-intensive occupations, the highest share among the EESC countries. Thus, focusing on matching educational skills with the requirements of the labour market is essential for the economy to make optimal use of its human capital, as highlighted in the World Bank's Systematic Country Diagnostic report (World Bank, 2018b). Furthermore, R&D activity concentrates predominantly

in research institutes and HEIs; the largest research institution remains the National Academy of Sciences (NAS), which employs approximately 5,500 researchers. In 2018, the number of people employed in R&D grew to 27,411; the majority are employed as researchers (65 per cent), followed by supporting staff (28.8 per cent) and technicians (6.2 per cent) (Belstat, 2020).

Synthesis

This table presents the main achievements and challenges in R&D and innovation (RDI) inputs for Belarus, based on the findings in this chapter.

Progress made so far

- Foreign and domestic investment in R&D (still) relatively high compared with neighbouring countries
- Strong science and research tradition and high tertiary education attainment, creating a pool of highly skilled human capital
- Relatively high share of high-tech exports in total trade, as well as of medium- and high-tech manufacturing
- Rapidly growing ICT sector with a strong international competitive position in services exports

Challenges ahead

- Increase business sector innovation by strengthening the business climate, sectoral synergies, the absorptive capacities of firms, their ability to cooperate with research institutions, and their access to risk financing.
- Match the skills acquired through education with the requirements and structure of the labour market.
- Further increase high-tech imports and FDI to boost international knowledge transfer and diffusion.
- Expand data collection on the innovation activity of firms to include indicators of non-technological innovation.

Source: UNECE.

Note

¹ Apanasovich et al. (2016) studied 489 Belarusian SMEs, comparing the impact of two modes of innovation on both their technological and their organizational levels, namely technological and scientific innovation (science, technology and innovation mode) and learning-by-doing, learning-by-using and learning-by-interacting (doing-using-interacting mode). They found that a combination of the two modes is most efficient in generating technological innovation (including product and/or process innovation). They also found significant positive correlation between organizational and non-technological innovation (doing-using-interacting), providing evidence for the hypothesis that learning-by-doing could be the most efficient mode for generating product innovation. Their findings have been confirmed by several research studies that concluded that good organizational and managerial practices heavily influence the adoption of innovations and have large marginal impacts on innovative development in transition economies (OECD, 2017; EBRD, 2019).

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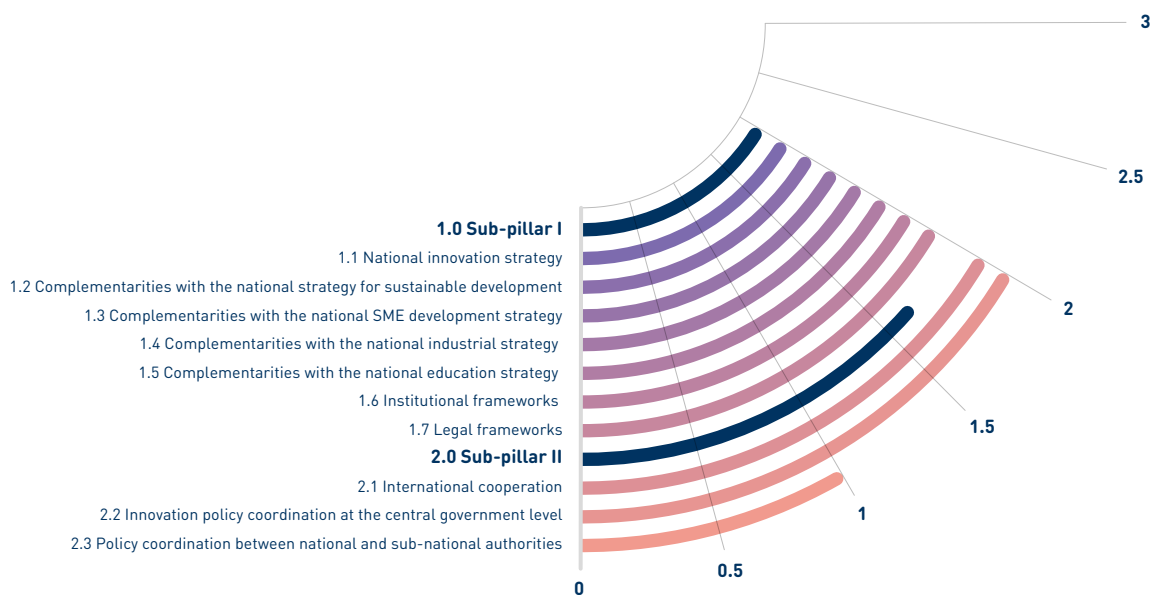
Chapter III

PILLAR I: INNOVATION POLICY GOVERNANCE

The first pillar of the IPO reviews the overarching strategic, institutional and legal framework for innovation policy, as well as the competences of and coordination among government bodies involved in innovation policy. This review assesses the extent to which innovation policy governance is sound, well-structured, efficient and flexible.

National innovation policy governance – strengths and weaknesses

Figure III.1 • Scoring of sub-pillars: innovation policy governance



Source: UNECE.

Note: Each indicator is assessed using a score from 3 to 0. The highest score (3) is given to fully fledged policy initiatives and mechanisms that can provide mutual learning opportunities for the EESC sub-region. A score of 2 is assigned if a policy initiative is operational. An indicator receives 1 point if a policy initiative is under development. The lowest score (0) is given if a country does not have a specific policy mechanism, strategic document or policy initiative. The indicators are based on an extensive questionnaire answered by government agencies and external consultants. The questionnaire consists of open, binary and multiple-choice questions. Additional statistical data supplement the formal assessment framework by informing on key socioeconomic trends and context conditions. Statistical data are not directly integrated into the qualitative indicators but are used to guide scoring decisions. For more information, please refer to Methodology and Process.

Over the last few years, Belarus has developed a robust system of science and innovation, though some improvements are needed in governance, cooperation and coordination. The State Programme on Innovation Development 2016–2020 and the National Strategy of Sustainable Socioeconomic Development 2030 govern the implementation of national innovation priorities. Mechanisms developed for ex-ante and interim assessments help to make strategic initiatives more effective and enable policy learning; however, in Belarus, evaluations of policy initiatives occur sporadically and are not fully implemented. National strategies are accompanied by action plans that establish detailed measures for achieving policy objectives and set mandates for responsible government authorities. Strategies in other domains, including education and the development of SMEs, are operational and linked with the State Programme on Innovation Development. Institutional and legal frameworks are robust enough to support innovation policy. Yet, some areas for improvement remain. To successfully implement policy initiatives, government authorities for science and innovation policy need to improve the quality and capacity of governance. International cooperation in innovation activities in the business sector is rather limited because of the current investment climate in Belarus. Policy coordination between national and subnational authorities occurs sporadically and needs to be further developed.

Table III.1 Overview of sub-pillars and indicators for innovation policy governance

Sub-pillar I: Innovation Policy Frameworks	Sub-pillar II: Innovation Policy Coordination
National innovation strategy	International cooperation
Complementarities with other policy areas	Innovation policy coordination within the central government and between national and subnational authorities
Institutional frameworks	
Legal frameworks	

Source: UNECE.

Sub-pillar I: Innovation policy frameworks

Given the many government levels involved in the design and implementation of innovation policy, it is vital to have a strategic document containing the Government’s overarching vision.

National innovation strategy

The national science and innovation policy in Belarus is governed by numerous policy documents and national strategies. The most recent documents that set priorities for long-term development are the National Science and Technology Strategy 2018–2040 adopted by the Presidium of the NAS in 2018, the State Programme on Innovation Development 2016–2020 and the State Programme for Socioeconomic Development 2030. The latter

set out a goal to increase the share of innovative and high-tech products in exports from the current 16 per cent to 25 per cent and the number of innovative enterprises as a share in the total number of companies from the current 20 per cent to 30 per cent by 2030.

The five-year State Programme on Innovation Development 2016–2020 steers science and innovation policy in Belarus. The State Programme for Socioeconomic Development puts innovation among five key priorities for medium-term development. It also outlines national objectives to support the development of the national science and innovation ecosystem and to accelerate collaboration between academia and industry. The Government regards science and innovation as important instruments to support the green economy and meet the Sustainable Development Goals (SDGs). The SDGs are incorporated into the socioeconomic development programme and other related strategic documents.

In 2019, the State Committee for Science and Technology (SCST) started developing a concept for the State Programme on Innovation for 2021–2025 and elaborating the next cycle of R&D programmes jointly with the NAS and line ministries. The programmes will be based on the updated list of national science and technology priorities for 2021–2025, to be approved in 2020. Informed by a 2018/2019 technology foresight exercise conducted by the SCST, the list of priorities includes selected research fields. Previously, Belarus had two lists, one for research priorities and one for scientific and technological development.

By 2030, the Government plans to raise the share of public expenditure on RDI to 2.5 per cent of GDP and create favourable conditions for private investment in RDI to grow to be up to 70 per cent of all such spending. It also plans to raise the contribution of science and innovation to socioeconomic development with an increase of the share of high-tech products in industrial production to 10 per cent and an increase of labour productivity to \$50,000 per employee. This ambitious vision can be realized if Belarus succeeds in resolving structural problems in the national science and innovation system and mitigating budgetary constraints caused by the COVID-19 pandemic. In Belarus, many large firms face challenges in modernizing technical equipment and developing innovative solutions. Some private enterprises and many public companies mainly use technologies from the mid-20th century. Low levels of market competition and the dominance of SOEs in several sectors also hinder the growth of innovation.

The State Programme on Innovation Development 2021–2025 is accompanied by changes in legislation and regulations targeted at encouraging entrepreneurship, developing the national innovation infrastructure and supporting nascent industries with high potential. It contains a list of national projects that strengthen the competitive positions of Belarusian research and industry and create the conditions for economic modernization.

Public research funding is distributed mainly through State programmes for scientific research (SPSRs) and State science and technology programmes (SSTPs). They distribute about 30 per cent of overall research funding, define policy priorities and assign government authorities to specific tasks of science and innovation policy initiatives. The SSTPs give special attention to supporting research commercialization and making possible positive socioeconomic effects of scientific research. The relatively short duration of projects funded by the SSTPs poses challenges for innovation grant recipients, as certain technological applications require significantly longer durations of funding. The strict compliance requirements of the SSTPs negatively affect the risk-taking behaviour

of grant recipients and thus do not contribute to technological breakthroughs and radical innovation. Significant constraints related to the use of public funding prevent scientists and firms from being eligible to receive State support and from using it with the utmost effectiveness. The choice of projects for funding depends on their alignment with the national priorities for science and innovation development.

Innovation in the business sector is seriously constrained by high interest rates, legislative gaps in regulating FDI and weak collaboration between academia and industry (EBRD, 2016; EU4Business, 2018; UNECE, 2017). Limited access to finance for enterprises and the scarcity of skills and competences among the workforce constrain the ability of Belarusian companies to innovate. The Government is experimenting with direct and indirect support mechanisms to fuel innovation-led economic growth, some of which do not show the desired effects. For example, RDI tax incentives do not contribute as much to growth in innovation as expected. A lack of information on the availability of these incentives, complex application procedures and the associated exposure to frequent inspections and checks decreases the efficacy of such incentives. The limited linkages between academia and industry remain an acute issue, negatively affecting research commercialization and innovation in the business sector.

Complementarities with other policy areas

Innovation policy in Belarus is dispersed across several strategic documents. In 2018, the Government adopted the SME promotion strategy, which seeks to increase the competitiveness of the economy by 2030. The contribution of SMEs to the economy remains limited due to imperfections of the business environment. Compared with the EU countries, where SMEs contribute to about 60 per cent of employment, in Belarus SMEs account for merely 33 per cent. The SME promotion strategy therefore aims to contribute to sustainable and inclusive economic growth and enable favourable institutional and economic conditions for entrepreneurial activities. It establishes a number of measures for increasing the gross value added by SMEs to 50 per cent by 2030, from 28.1 per cent in 2015. The Government continues on its course of removing regulatory barriers and simplifying legislation on public procurement, business establishment and insolvency. Yet, Belarus still treats public entities and private firms differently with regard to taxation, access to government support and competition policy. In order to spark growth in innovation in the country, the preferential regime for SOEs should be replaced by policy frameworks that ensure more equal treatment of private firms. Further development of SMEs is hindered largely by legal and regulatory requirements and by the nascent institutional frameworks (OECD, 2017). The country still needs a well-functioning SME development agency with a mandate to formulate, design and implement policy initiatives.

The National Industrial Development Programme, adopted in 2012, defines government actions aimed at strengthening the industrial complex in Belarus. One of its objectives is to increase the share of high-technology exports. It aims to achieve higher levels of technological intensity through a set of measures including the creation of industrial laboratories at HEIs and public research institutes, and the launch of joint research and production centres and specialized engineering centres. In addition to this programme, a number of sectoral initiatives support the development of industrial sectors. Examples include the State Programme for the Development of the Pharmaceutical Industry 2016–2020 and the State Programme for the Development of the Engineering Complex 2017–2020.

The State programme “Education and Youth Policy” was developed to improve the quality and accessibility of education in accordance with the needs of the innovation economy and the information society. The programme facilitates the satisfaction of the educational needs of citizens and supports the development of the potential of young people. Programme performance is assessed using two main indicators: improvement of the position of Belarus in the United Nations Human Development Index and involvement of young people in youth policy initiatives. The priorities of the education policy are to achieve the digital transformation of education and to modernize the technological infrastructure required for teaching.

Institutional frameworks

The SCST is the major State institution supporting the formulation, design and coordination of science and innovation policy. Operating under the Council of Ministers, it is charged with the following functions:

- Formulate, implement and evaluate science and innovation policy initiatives.
- Coordinate national science and innovation policy.
- Plan the budget for research and innovation.
- Coordinate international cooperation in science, technology and innovation (STI).
- Develop national innovation infrastructure.
- Commercialize research.
- Support innovation activities in SOEs.
- Create favourable conditions for protecting intellectual property rights (IPRs).

Jointly with the NAS, the SCST develops national forecasts of science and innovation that help government institutions conceptualize policy documents. The SCST also manages allocations of the Belarus Innovation Fund (BIF) and monitors the effectiveness and the targeted use of financial resources for innovation support.

The BIF, founded in 1999, funds innovation activities in Belarus, strengthens international cooperation on science and innovation, and contributes to developing innovation infrastructure. It distributes approximately 18 per cent (\$26.6 million in 2018) of all public expenditure on R&D. It allocates funds only to projects that have a strong innovation component related to national science and innovation priorities. In addition to equity financing, the BIF provides innovation vouchers for start-ups. The vouchers have not become popular because of the complexity of the application process and the limited access to information about them. To increase the effectiveness and efficiency of funding schemes, the BIF could simplify its application procedures and streamline its reporting workflows. To support the development of radical innovations in high-risk markets, it could launch venture financing schemes that do not require full repayment in the case of project failure.

The NAS has a complex hierarchical structure that brings together the most important R&D organizations in the country. It includes some 70 research organizations as well as a number of laboratories, design bureaux, production facilities, experimental stations and other support bodies. Formally, the NAS has a very high administrative status, equivalent to or even higher than that of a ministry: it reports directly to the President and the Council of Ministers.

An important recent trend in NAS activity has been its growing emphasis on commercializing some of its R&D results. This matches a similar change in the general orientation of Belarus STI policy, as reflected in some recent legislative and regulatory changes. Thus, the downstream production facilities within the NAS, established with the specific purpose of commercializing its R&D results, have been steadily growing in both the size and the volume of their commercial output. Another recent development has been the formation of a number of clusters, in response to the recent government policy initiative supporting cluster development. Unlike in some other countries, cluster formation in Belarus is a State-led process, not the result of interactions among public and private innovation actors. The NAS coordinates fundamental research in Belarus and, similarly to the line ministries, plays the role of State customer for several ongoing SSRPs and some SSTPs. No decisions on science and innovation policy are made without the participation of the NAS.

Legal frameworks

Belarus has a detailed legal framework for innovation policy and has worked to amend it and harmonize priorities across documents. The main legal act defining the frameworks for the development of science and technology is the Law on Innovation Policy and Innovation Activities (10 July 2012), which was developed on the basis of the Model Law on Innovation Activity No. 27-16 of the Intraministerial Assembly of the Commonwealth of Independent States. The law establishes key principles, definitions and arrangements for State innovation policy. The policy was designed on the basis of the State Innovation Development Programme, which covers a period of five years and is ratified by the President. Ministries and a broad group of government agencies can design separate innovation development programmes and strategic documents for their areas of expertise, thus contributing to the formulation of national science and innovation policy.

In 2019, an interdepartmental working group created by the SCST introduced a set of amendments to the Law on Innovation Policy and Innovation Activity that clarified its main terms and described the competences and functions of government agencies with responsibilities related to science and innovation. The amendments also set an order for designing, funding and implementing the State Programme on Innovation Development and designated funding sources for the national innovation infrastructure.

The President's Edict on STI activities (No. 197, 27 May 2019) harmonizes strategic documents, outlines new measures and approaches for accelerating research and innovation activities, and defines the functions and roles of public authorities. It sets an objective to create an enabling environment for Industry 4.0 and for the development of precision agriculture and personalized medicine in particular. It lays down a foundation for developing favourable legislative frameworks that will enable highly effective STI activities. It also calls for introducing mission-oriented research in the design of funding mechanisms for public research and expanding public-private partnerships and venture capital investment to tackle scientific and technological challenges. The Edict establishes a single list of priorities for RDI activities that will steer science and innovation starting in 2021:

- Digital transformation and ICT technologies
- Biological, pharmaceutical and chemical technologies
- Energy, construction and environmental management

- Engineering, machine building and materials science
- Agriculture and food technologies
- Social well-being and national defense

Discrepancies in legislation in Belarus need to be addressed. For instance, definitions of novelties and innovation differ in some laws, making the laws restrictive. The Government needs to pass supporting legislation to ensure the complete implementation of legal frameworks that have the desired results. The Government is already updating the Law on Innovation to align it with the current challenges and new conditions of the national science and innovation system.

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Belarus has a long-standing culture of scientific research and existing centres of research excellence. ✓ The country has a relatively long history of well-structured and systematic approaches to science and innovation policy. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The capacities of government agencies to support innovation policy are insufficient. 	<ul style="list-style-type: none"> ✓ Build capacity in designing, formulating and implementing innovation policy initiatives in government agencies and foster public sector innovations to increase the effectiveness and efficiency of policymaking. 	Medium-term	Government
<ul style="list-style-type: none"> • The potential use of policy mechanisms to support in the business sector is untapped. 	<ul style="list-style-type: none"> ✓ Implement measures to increase innovation activities in SOEs, enable higher levels of competition in the domestic market and provide targeted support to innovative enterprises through direct and indirect support measures. 	Medium-term	Ministry of Economy
<ul style="list-style-type: none"> • Cooperation between academia and industry and commercialization of research are both limited. 	<ul style="list-style-type: none"> ✓ Implement concerted actions targeting the promotion of an entrepreneurial spirit among public organizations conducting RDI, increasing the quality of research and its alignment with business needs, and improving the business environment. 	Medium- to long-term	Government

Source: UNECE.

Sub-pillar II: Innovation policy coordination

Coordinated approaches help avoid overlapping, duplicating or omitting actions required to implement innovation policy successfully.

International cooperation

International cooperation is an integral element of innovation policy. Among the main priorities of the State Programme for Innovative Development 2016–2020 are the development of international cooperation on STI and the export of high-technology products and technologies. Belarus has signed agreements for scientific and technical cooperation with 48 countries and participates in international projects using joint research infrastructure, including the Large Hadron Collider and nuclear research in Dubna.

As a member of the Eurasian Economic Union, Belarus actively cooperates with other member countries on science and innovation. The operational regulatory supranational body is the Eurasian Economic Commission. One of its first practical cooperative steps in supporting innovation was to establish the Centre for High Technologies, a Eurasian venture company whose mission is to support high-growth, early-stage, high-tech, innovative companies targeting the market of the Eurasian Economic Union. In 2016, an innovation fund for venture capital investment was founded jointly by the BIF and the Russian Venture Company to accelerate innovation activities. Because of constraints of the Belarusian legal system, the fund was registered in Russia, but it promotes innovation in Belarusian companies and supports joint projects between the two countries.

Restrictions on business activities and the investment climate mean that Belarus does not attract significant FDI (IMF, 2018). Yet credit resources and borrowed funds are attracted, mostly from China and the Russian Federation, and the EU to a lesser extent. The outflow of highly skilled professionals, especially in the IT sector, may undermine the future socioeconomic development of Belarus. Global competition for skilled workers is increasing. To retain the economy's qualified workforce and attract talented professionals from abroad, working conditions and career prospects in Belarus need to improve.

With regards to international comparisons, Belarus initiated the design of statistical indicators for comparative evaluation of Belarus with the other countries covered by the EU Innovation Union Scoreboard. Statistics are developed annually and published for 16 of the 25 indicators; the other indicators are not included at this stage because of data scarcity. Methodological harmonization was undertaken to update forms used for statistical reporting by institutions carrying out R&D. Other reforms addressed innovation-related statistics and the nomenclature of economic activities and products. For example, since 1 January 2016, national classifications have been harmonized with the latest relevant international versions, by activity (NACE 2008) and by product (CPA 2008).

Despite all the positive efforts to upgrade methodologies and mechanisms for collecting statistics, some important constraints remain. For instance, Belstat's enterprise survey of innovation activities focuses only on R&D expenditures and innovation output (that is, sales of innovative products). It does not cover some other critical aspects of

the innovation activity of modern firms (for example, product and process innovations, collaboration with external partners). Another challenge concerns the population of the national innovation survey, which has yet to cover a representative sample of firms from all sectors.

Innovation policy coordination within the central government and between national and subnational authorities

The SCST is a republican government body that implements State policy and regulates and manages STI activities, as well as protection of IPRs. It coordinates activities in these areas with other republican government bodies and is subordinate to the Council of Ministers. The Council of Ministers is chaired by the Prime Minister and includes ministers and other senior officials, as well as leading national scientists. The SCST and the Council of Ministers coordinate national innovation policy at all stages, ranging from conception to final evaluations.

The national innovation system is governed by the President, the Council of Ministers, republican government bodies, the NAS, other state organizations and local governments. Regional authorities are not actively involved in formulating and designing science and innovation policy. They can allocate land within the framework of an investment agreement, but in general, this does not apply to mechanisms of innovation. Many regions (for example, Vitebsk, Gomel) have established technology parks, either directly or through their utilities, and provide direct funding support from innovation funds.

Sub-pillar II		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Belarus has had long-standing cooperation in science and innovation with countries of the Commonwealth of Independent States. ✓ Functioning coordination bodies and policy mechanisms contribute to improving innovation policy frameworks. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Increasing international competition for highly skilled workers makes it challenging to retain local talents. 	<ul style="list-style-type: none"> ✓ Improve the use of HEIs as effective instruments for attracting talent from abroad and fostering international cooperation in research and innovation. Accompany this effort by creating favourable working conditions and good governance mechanisms. 	Medium to long term	Ministry of Education
<ul style="list-style-type: none"> • Coordination of regional science and innovation policy initiatives is inefficient. 	<ul style="list-style-type: none"> ✓ Create mechanisms for identifying and exchanging best practices in formulating and implementing regional science and innovation policy initiatives. 	Medium-term	SCST Ministry of Economy
<ul style="list-style-type: none"> • Integration of domestic enterprises into global value chains is low. 	<ul style="list-style-type: none"> ✓ Develop holistic approaches for integrating domestic enterprises into global value chains: harmonizing certification and standards, consulting services for domestic enterprises in management of IPRs and international marketing. 	Medium-term	Government

Source: UNECE.

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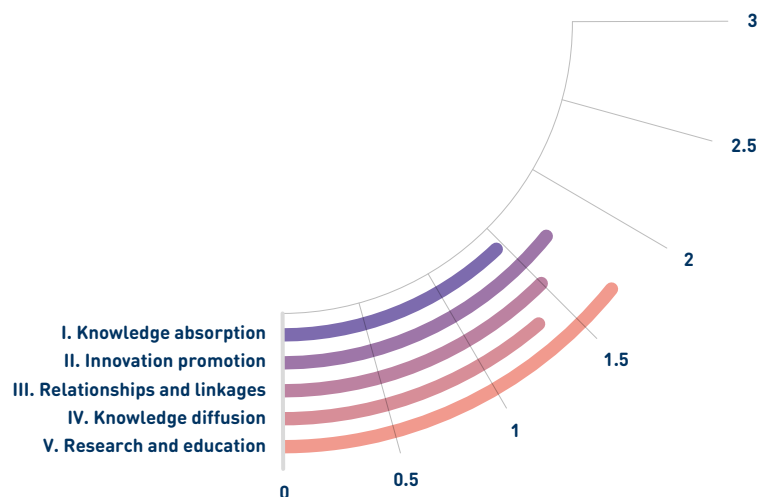
Chapter IV

PILLAR II: INNOVATION POLICY TOOLS

This chapter reviews the policy mechanisms in Belarus that enable, promote and diffuse innovation. It addresses five sub-pillars: knowledge absorption, innovation promotion, relationships and linkages, knowledge diffusion, and research and education.

National innovation policy mix – strengths and weaknesses

Figure IV.1 • Scoring of sub-pillars: innovation policy tools



Source: UNECE.

Note: The IPO pillar scoring is calculated on the basis of the average quantitative assessment of individual indicators under each sub-pillar. In the evaluation all support measures in a given area are taken into account and special consideration is paid to indirect contributions from external mechanisms. The overall band score for each sub-pillar forms the following generalized categories: 0.0–0.5, No policy instruments/mechanisms exist; 0.5–1.5, Policy efforts are in their initial stage of development; 1.5–2.5, Policy efforts are evident and partial implementation takes place; 2.5+, Policy efforts are comprehensive and monitoring activities are systematic. The scores for individual indicators are as follows: 0, No policy instrument/mechanism exists; 1, A policy measure/s is/are under development /has/have partial or indirect impact; 2, A policy scheme/s is/are operational and implementation has started; 3, Implementation is advanced and evaluation/impact assessment is taking place. Policy measures with sector-specific or partial or non-targeted impact on a given area are subject to case-by-case evaluation. For a more detailed discussion of the IPO scoring methodology, please refer to Methodology and Process.

In line with the State Programme for Innovative Development 2016–2020, the innovation policy mix in Belarus aims at stimulating the development of a knowledge-based economy while harnessing growth in areas with high potential for innovation and for contributing to the Sustainable Development Goals. In this context, the IPO analysis of pillar II found that Belarus performs relatively well on the sub-pillars of *Research and education* and *Innovation promotion*, with room for improvement in the sub-pillars of *Relationships and linkages*, *Knowledge diffusion* and *Knowledge absorption* (figure IV.1). Overall, policy efforts to stimulate innovation demand and supply are evident, yet many are nascent or not implemented according to plan. Indeed, recent years have seen policy support offered for the growing ICT sector and technology start-ups, as well as an overall drive to align public inputs with market needs, including expansion of the innovation support infrastructure, higher-education reforms and support for private sector development. Among the main impediments to commercializing research and to innovation are low access to early-stage finance, a scarcity of entrepreneurial experience and weak industry-science linkages. Policy tools in these areas are often insufficiently targeted to address – and at times even incompatible with – the objective of defraying part of the risk of innovation, a situation that might discourage rather than stimulate innovative development and lead to unintended consequences such as rent-seeking, the creation of entrenched interest and undermining of market competition. Moving towards a knowledge-based economy thus requires policy support measures geared towards building a viable system that enables and promotes experimentation, harnessing the potential of the country’s pool of highly skilled human capital to drive innovative development – all within tight and, over the next decade, probably tightening fiscal conditions.

Table IV.1 Overview of sub-pillars and indicators for innovation policy tools

Sub-pillar I: Knowledge Absorption	Sub-pillar II: Innovation Promotion	Sub-pillar III: Relationships and Linkages	Sub-pillar IV: Knowledge Diffusion	Sub-pillar V: Research and Education
Promotion of public and private sector organizational and managerial practices	Business plan and start-up competitions	Innovation voucher schemes	Information and brokerage schemes for technology upgrading	Policies to increase the number of science, technology, engineering and mathematics graduates
Schemes to support the development of technical and business services	R&D loans	Cooperative R&D grants	Standards, testing and certification instruments for SMEs	Policies to foster research development
Fiscal incentives for acquiring knowledge capital	VAT exemptions	Supplier matching services	Industrial technology assistance programmes and extension services for SMEs	
	Technology incubators	S&T parks	Public procurement for innovation	
		Innovation spaces	Digitalization	
		Technology accelerators		
		Business networks and clusters		
		Academia-industry linkages		
		Diaspora networks		
		Gender equality		

Source: UNECE.

Sub-pillar I: Knowledge absorption

The process of assimilating external knowledge plays a substantial role in developing dynamic core competencies, as well as in gaining competitive advantage and creating new value chains.

Promotion of public and private sector organizational and managerial practices

Promotion of public sector organizational and managerial practices in Belarus is not implemented under a dedicated scheme at the national level. Instead, separate support measures are in place to strengthen the managerial and organizational capacities of civil servants, as outlined in two presidential decrees: On the State Programme of Innovative Development (2017) and On the Improved Qualifications of Public Sector Personnel (2009). In line with these, the Academy of Public Administration provides short-term courses of advanced training and retraining to about 4,000 civil servants annually.¹ In addition, a system of seminars facilitates the exchange of good practices between State bodies, research institutes and manufacturers, and nine SOEs recently took part in an efficiency training programme funded by the EU. As SOEs account for up to 30 per cent of total value added in Belarus (IMF, 2019) and almost 20 per cent of value added was generated by corporations with more than 50 per cent state ownership (Belstat, 2020), it is essential that appropriate measures are applied to ensure high productivity and performance across all sectors so as to maintain and increase the competitiveness of the country's diversified product basket.

Promotion of organizational and management practices in the private sector is mainly supported through donor-funded and private initiatives. Entrepreneurial associations and chambers of commerce² regularly conduct seminars, consultations and round tables on matters such as business management, exports of innovative products and investment attraction. Donors such as the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO) and the Eastern Partnership provide support through international cooperation programmes such as the European Bank for Reconstruction and Development (EBRD) Advice for Small Businesses, implemented since 2011. The Government also needs to make policy efforts in response to the increasing demand for business education and the limited organizational and managerial capacities in the SME sector. Specific measures to enhance the organizational and managerial capacities of SMEs are outlined in the SME Development Strategy "Belarus is a country for successful entrepreneurship" for 2018–2030 (Belarus, Council of Ministers, 2018). According to the strategy, implementation will begin in the principal stage during 2021–2030, following completion of the State programme called Small and Medium-sized Enterprises in the Republic of Belarus for 2016–2020 (Belarus, Council of Ministers, 2016).

Schemes to support development of technical and business services

Technical and business services (TBS) are not yet fully developed in Belarus and remain supported mainly through donor-funded projects. The EBRD's Advice for Small Businesses

programme is the most prominent example, covering up to 75 per cent of the net costs of consulting projects. Business unions provide registers of support services. The Republican Union of Employers has created a knowledge-sharing platform. The Republican Confederation of Entrepreneurship offers quality assurance and investment advice on TBS to SMEs. Recent positive developments include the establishment of several incubators and entrepreneurship support centres. In addition, a specialized government agency for SME development is being established, as highlighted in the SME Policy Index 2020 of the Organization for Economic Cooperation and Development (OECD, 2019). The agency will aim to strengthen capacities to develop TBS in response to market needs. Indeed, the EBRD Business Environment and Enterprise Surveys (BEEPS IV and V) identify rising demand for engineering and marketing services, leading to a mismatch on the TBS market, which is compounded by low awareness of the role of TBS in business development.

Fiscal incentives for acquiring knowledge capital

Belarus provides an array of fiscal incentives to resident enterprises of its free economic zones (FEZs), the GSIP³ and the HTP. Although the fiscal regimes offered by the FEZs and the GSIP aim at attracting FDI and promoting exports by producing new, high-tech and innovative products (Belarus, President of the Republic, 1996; 2012), the HTP regime emphasizes innovative development even more, which contributes significantly to the development of the ICT sector in Belarus (table IV.2). In addition to the fiscal and other benefits that these structures grant (for example, providing services, leasing land at subsidized rates), they stimulate innovation nationally through introducing fiscal incentives for knowledge-based enterprises, as envisioned in the State Programme for Innovative Development 2016–2020. Special privileges exist on the tax discount for profit from innovative and high-tech goods, the latter being granted to agents that obtain over 50 per cent of total revenue from such goods (Belarus, House of Representatives, 2009). This practice differs from fiscal policies applied elsewhere in the sub-region as it directly targets innovation and stimulates production of an approved list of innovative and high-tech goods.

Table IV.2 Special fiscal regimes within economic zones

Exemption	FEZs (6)	HTP	GSIP
Income tax	<p>10 years for enterprises registered after 31 December 2011</p> <p>5 years for enterprises registered before 31 December 2011</p> <p><i>50 per cent reduction thereafter</i></p>	<p>Full</p>	<p>10 years</p> <p><i>50 per cent reduction thereafter</i></p>
Income tax from individuals (employees)	<p>–</p>	<p>4 per cent reduction</p> <p>9 per cent income tax at HTP relative to 13 per cent nationally</p>	<p>4 per cent reduction</p> <p>9 per cent income tax at GSIP relative to 13 per cent nationally</p>
Property tax	<p>Full for properties acquired within three years of registration, excluding property leased by residents</p>	<p>Full excluding property leased by residents</p>	<p>Until 2062</p>
Land tax	<p>Full for the first five years after registration</p>	<p>Three years</p>	<p>Until 2062</p>

Table IV.2 Special fiscal regimes within economic zones (Concluded)

Exemption	FEZs (6)	HTP	GSIP
Dividends tax	–	Full	Full for the first five years of accrual
Value added tax	Full for goods produced with imported equipment and raw materials under the free trade zone regime and sold within the Eurasian Economic Union market, conditional on payment of custom duties for these goods	Full on sales of goods and services produced in Belarus, and services provided abroad	Full on exported goods
Year established	1996 (FEZ Brest)	2005	2012
Establishing decree	Presidential Decree No. 114, 1996 On Free Economic Zones on the Territory of the Republic of Belarus	Presidential Decree No. 12, 2005 On the Hi-Tech Park	Presidential Decree No. 253, 2012 On the Chinese-Belarusian industrial park
Links to strategic policy documents and presidential decrees	National Strategy for the Sustainable Social and Economic Development of Belarus for the period until 2030	Decree No. 8, 2017 On Development of the Digital Economy	National Strategy of Industrial Development of Belarus until 2020 National Strategy for the Sustainable Social and Economic Development of Belarus until 2030
Amount of tax exempted, 2017	\$130.6 million		
Amount of tax exempted, 2018	\$168 million		

Sources: Ministry of Taxes and Belarusian Institute of System Analysis (obtained through IPO self-assessment questionnaire, 2019), Ministry of Economy (Belarus, 2020; EBRD, 2018).

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ Annual training and re-training of civil servants that let them reinforce and develop professional qualifications are a positive development for public sector organizational and managerial practices.
- ✓ Fiscal incentives for innovation have been introduced that aim to drive the greater development of innovative products and high-tech goods, provided regular impact assessment takes place.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Policy measures do not sufficiently address the rising demand for TBS or the need to develop good private sector organizational and management practices. 	<ul style="list-style-type: none"> ✓ Develop targeted measures to catalyse, stimulate and improve provision of TBS by the private sector (for example, co-financing instruments, quality assurance certification). ✓ Assess the market for TBS regularly, both to ensure a critical mass of supply and demand responses minimizing the need for intervention and to identify TBS that are new to the domestic market and have high potential for innovative development (for example, new ways to help SMEs develop internal capacities in marketing and engineering at early stages). 	Medium-term	Ministry of Economy
<ul style="list-style-type: none"> Tax assessment is aggregate and does not differentiate the impacts of fiscal incentives, making it difficult to understand the effects of incentives on the economy and on innovation in particular. 	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the existing array of fiscal incentives quantifying the economic effects of each one to ensure efficient policy support. 	Short-term	Ministry of Taxes and Duties

Source: UNECE.

Sub-pillar II: Innovation promotion

Promoting innovation requires governments to invest in establishing platforms where young companies can develop and test innovative ideas.

Business plan and start-up competitions

The number of start-up events in Belarus has increased significantly in recent years – from 123 in 2014 to 418 in 2019 – signifying the immense growth of the country’s start-up movement. Each year the Ministry of Economy (MoE) approves a start-up action plan with events, including start-up weekends, project competitions, forums and master classes (Belarus, MoE, 2019). The BIF⁴ organizes a national innovation competition that aims at commercializing selected projects and closely monitors their implementation. International donors provide further support in the field: the EU-funded project “Support to economic development at the local level in the Republic of Belarus for the period 2019–2022” stimulates entrepreneurship through competitive financial support mechanisms for business incubator, start-up and cluster projects, with a budget of \$9.5 million.⁵

Support for RDI investment

Obtaining early-stage finance for risk-carrying innovative projects can be challenging for local entrepreneurs. Targeted R&D loans and guarantee schemes are not available, and concessional loans are scarce. A financial support system for SMEs established by the Development Bank in 2014 offers preferential loans to local business owners. Other direct financing instruments available are grants from domestic and international programmes, as well as venture capital. Specifically targeting innovative projects, the BIF offers competitive funding for commercializing research. It has also operated a national innovation voucher and grant scheme since 2013, to stimulate innovative development and support start-ups at all development stages (Belarus, President of the Republic, 2013). Equity financing is available through the Russian-Belarusian Venture Investment Fund (RBF)⁶ for start-ups and SMEs. Business angel initiatives have also been emerging, accounting for most seed investment made in the country in 2017.

Nevertheless, funds under some of the schemes have yet to be allocated – the RBF’s portfolio has only one Belarusian project, and the BIF has not yet distributed any vouchers. Additional tax incentives and venture financing are needed, as highlighted in a survey of the innovative activity of 122 Belarusian industrial enterprises performed by the Institute of Economics, at the NAS, in 2017 (Trigubovich, 2017). According to a study funded by the U.S. Agency for International Development (USAID) of venture funding in Belarus, many entrepreneurs do not attempt to raise funds despite their need for seed capital. The main reasons are a lack of experience in attracting investment and a lack of relevant knowledge (Belbiz, 2017). Through Belbiz, as the implementing agency, USAID is working on the legislative framework for venture capital to amend the Tax and Civil Codes as well as the corporate laws. Working groups are reviewing proposed amendments to relevant provisions under the National Centre for Legislation and Legal Studies, the SCST and the MoE.

Funding for commercializing early-stage research can also be obtained from international funds and programmes, such as Horizon 2020, the EU's largest support programme for science and technology development, with a fund of €80 billion (Belarus, Institute of Economics of the NAS, 2019a). Coordinated by the SCST, participation by Belarus in Horizon 2020 has attracted €6.4 million for scientists in 41 projects (as of 2019) over the programme's implementation period.

Technology incubators and accelerators

The technology incubator scene is at the initial stage of development, though the business support infrastructure consists of 25 incubators and 105 business centres. They mainly support SMEs in organizing entrepreneurial activities, rather than innovation activities. Specifically targeting innovative and science and technology development are four entities that offer incubation services, three of them technology parks. Areas that need improvement are the small scale of technology incubators, their concentration in large cities and the limited range of their services, which often do not cover all stages of development.

Private technology accelerators started to appear in 2013, with the first accelerator being TechMinsk. Four accelerators now operate in the country, providing innovative start-ups with services (IT, financial technology and the like) and private equity investment. Further developments are needed to ensure that Belarusian start-ups remain operational on the domestic market and do not relocate abroad in their search for a greater number and higher level of services, as well as quick access to significant financial resources.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ Business plan and start-up competitions have gained popularity in recent years, supporting the growing start-up movement both nationally and regionally.
- ✓ Policy efforts have been made to expand the business support infrastructure (by establishing new incubators and business centres).
- ✓ Several schemes have been introduced to offer financial support to start-ups at the early stage of development, including competitive funding for commercializing research (through the BIF) and a venture finance mechanism (through the RBF).

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Despite the existing support measures, low access to finance still impedes entrepreneurs aiming to realize innovative ideas and obstructs the commercialization of scientific activity. 	<ul style="list-style-type: none"> ✓ Expand the policy support for early-stage finance (for example, with start-up grants), and introduce direct financial support for R&D (for example, credit guarantees) to foster innovation activity at all development stages and enable the commercialization of innovations. 	Medium-term	SCST MoE Belarusian Development Bank
	<ul style="list-style-type: none"> ✓ Building on ongoing initiatives, and in consultation with potential investors and international finance institutions, conduct a comprehensive assessment of the legislation, macroprudential regulation and oversight relevant to equity funding mechanisms for innovative projects (for example, domestic and foreign venture capital, private equity, pooled funds), aiming to introduce changes to streamline rules, ensure appropriate investor protection and remove unnecessary obstacles to such structures. 		

Sub-pillar II		IPO evaluation and recommendations (Concluded)	
Area for improvement	Recommendation	Time frame	Responsibility
	<ul style="list-style-type: none"> Develop, in consultation with international finance institutions and potential investors, a road map for piloting one or more public-private venture capital funds, privately managed under a clear, SDG-related mandate, redirecting some funds from less successful instruments for this purpose, aiming to catalyse through limited government subsidy and risk defrayal the development of venture capital in Belarus while ensuring that the Government is able to capture and reinvest some of the returns from successful investment. 	Medium-term	SCST MoE Belarusian Development Bank
<ul style="list-style-type: none"> Policy support for innovation promotion does not fully address the incomplete service portfolio of incubators and the insufficient acceleration programmes. 	<ul style="list-style-type: none"> Assess market needs for services offered at incubators (for example, through surveys of start-ups) and integrate the most demanded services in the portfolio of the business support infrastructure (for example, market intelligence services). 	Short-term	MoE
	<ul style="list-style-type: none"> Expand some of the incubator structures by integrating acceleration programmes to help start-ups reach the next development stages. 		
	<ul style="list-style-type: none"> Build on the dynamics on the domestic market, enabling the use of private sector practices. 		

Source: UNECE.

Sub-pillar III: Relationships and linkages

Schemes that promote linkages between science and industries help create innovative ecosystems by assisting scientists and businesspeople in commercializing research, creating products and developing organizational processes.

Business networks and clusters

The role of supporting business networks in Belarus is assumed mainly by associations of commercial entities and individual entrepreneurs. The Belarusian Chamber of Commerce and Industry (BelCCI) connects its members with potential investors and partners through networking events, organizes bilateral and multilateral negotiations, and provides ad hoc supplier matching services to enterprises. BelCCI has also established a committee on industrial policy and entrepreneurship, providing a discussion platform for businesses to form a unified position on issues of industrial policy, while sustaining an open dialogue with State bodies and with foreign and international organizations. Also supporting business networks are the public association the Minsk Capital Union of Entrepreneurs and Employers and the Republican Confederation of Entrepreneurship, which manage a range of networking activities, including organizing international business-to-business events, conferences, forums and trainings. Furthermore, a centre for industrial cooperation created under the Belarusian Fund for Financial Support of Entrepreneurs will soon make available a comprehensive database of contractors and subcontractors, facilitating linkages between businesses.

Cluster development in Belarus is monitored by the MoE in line with the Concept on the Formation and Development of Innovative Industrial Clusters in the Republic of Belarus

(adopted in 2014). The MoE published an evaluation it conducted in 2019 that included an interactive map of operational, emerging and potential clusters. Four clusters operate in innovative industrial sectors (table IV.3), four are emerging, and 15 groups of business entities have been identified as potential clusters.

Table IV.3 Operational clusters

Cluster	Region	Number of organizations
Biotechnology and green economy	Pripyat Polesye	28
Information technology	Minsk	50
Medicine and pharmaceuticals	Vitebsk	10
Innovative instrument engineering	Minsk	10

Source: Belarus, MoE (2019).

Innovation support infrastructure

The innovation infrastructure in Belarus has been actively developing in recent years; it comprises 25 organizations, of which 16 are technology parks, 8 are technology transfer centres and 1 is the BIF. Positive dynamics are observed in terms of the number, employment and revenues of residents of these entities, with the total volume of their production reaching approximately 0.1 per cent of GDP. In addition to an array of fiscal benefits, the HTP and the GSIP grant their residents access to an international investor network and incubation services; the latter also has an innovation centre for commercializing science and technology activity. Several other parks target innovative enterprises and high-tech industries (table IV.4), some contributing to start-up development at the regional level. Yet, only a few of the registered infrastructure elements have been successful. Many are in the initial stages of development, limiting their activity to leasing premises and physical equipment; these find themselves in need of significant investment and training. In particular, engineering and marketing services are in demand. Only a few entities provide such services, both private parks (for example, EnCata) and public organizations (for example, the Science and Technology Park Polytechnic of the Belarusian National Technical University (BNTU)). The lengthy procedures for allocating financing for developing innovative infrastructure could cause parks to pause construction for lack of funds, shifting priorities away from the development of resident firms. In addition, the start-up movement needs more support to promote innovative entrepreneurship in the regions.

The technology transfer system in Belarus plays an important role in stimulating research commercialization by providing support in three main areas: evaluation of the commercial value of science and technology activity; development of business plans for effective use of resources; and upgrading of technology for increased competitiveness. The Republican Centre for Technology Transfer (RCTT),⁷ the leading institution, has the primary goal of enhancing cooperation between researchers, entrepreneurs and investors in Belarus,

and conducts its activity in five regional offices and 30 branches at universities, research institutes and enterprises. The RCTT project “Business Cooperation Centre EEN-Belarus” connects domestic research organizations, universities and SMEs with the Enterprise Europe Network (EEN), fostering cross-border business cooperation, technology transfer and scientific research; the project period is 2015–2021.⁸ The IPO analysis found that awareness about the Centre and its activities, however, is not high across the business and start-up community.

Table IV.4 Selected science and technology parks

Name	Year of establishment	Location	Scope of activities
BNTU Science & Technology Park Polytechnic	2012	Minsk	<ul style="list-style-type: none"> ✓ Provide modern infrastructure and equipment to BNTU students ✓ Assist with business planning and search for financing ✓ Offer information, marketing and engineering services, intellectual property protection
Gomel Technopark	2016	Gomel	<ul style="list-style-type: none"> ✓ Lease office premises and physical equipment ✓ Provide technical and advisory assistance with the production of high-tech goods and services ✓ Assist with foreign economic activity and promotion of manufactured high-technology products on foreign markets ✓ Provide media coverage of the activities of incubator residents
Mogilev Technopark	1998	Mogilev	<ul style="list-style-type: none"> ✓ Lease specially equipped premises for organizing innovative business ✓ Provide advisory services, assisting with investor linkages, launching start-up events, and the like
Minsk City Technopark	2011	Minsk (city)	<ul style="list-style-type: none"> ✓ Lease office, production and warehouse space to innovative start-ups ✓ Provide support for implementing innovative projects through educational services, events and equipment sharing, as well as development of the high-tech sphere
Minsk Regional Technopark	2011	Minsk (region)	<ul style="list-style-type: none"> ✓ Lease premises to innovative manufacturing firms ✓ Main current activities include processing of tyres, sale of rubber crumb and textile cord
Technopark Gorki	2017	Gorki	<ul style="list-style-type: none"> ✓ Lease premises and equipment to innovative enterprises in agriculture, agricultural biotechnologies and the green economy ✓ Assist with commercializing agricultural high-tech and business incubation for scientific projects ✓ Provide consulting services and assistance with foreign economic activity
EnCata	2016	Minsk	<ul style="list-style-type: none"> ✓ Provide engineering and consulting services for product development, design engineering and prototype manufacturing ✓ Offer software and hardware development, commercial R&D

Source: UNECE.

Academia-industry collaboration and mobility

The increasing demand for business education calls for creating stronger linkages between Belarusian HEIs and industry. However, mobility between academia and industry is limited, and no policy tools are implemented to strengthen industry-research networks. Belarus also lacks a common system to stimulate research evaluation between academia and industry, although separate policy elements promote the interaction of scientists with industry. For instance, commercialization of R&D results is one of the criteria for evaluating the activities of doctoral degree candidates. Having implementation certificates indicating close collaboration with industry representatives is also an admission requirement for some technical degrees at HEIs. Bonus payments are added to researchers' remuneration on the basis of assessments of their scientific activity, including commercialization of scientific developments, inventive and patent-licensed work and participation in innovative programmes and projects.

Diaspora networks

The need to leverage diaspora networks to drive international cooperation is included in the Programme for the Improvement of the Scientific Sphere of the Republic of Belarus (approved in 2013). Bellsa developed a database of more than 500 expatriate scientists in 2012 and studied applicable measures for cooperating with the diaspora. In addition, the Consultative Council for Belarusians Abroad at the Ministry of Foreign Affairs regularly engages with representatives of the Belarusian diaspora, promoting cooperation. Nevertheless, no dedicated scheme has been implemented to attract highly qualified specialists from the pool of nearly 5,000 Belarusian scientists working abroad today.

Gender equality

Women's empowerment in Belarus is supported by several measures (for example, advisory legal assistance, training, financial support) outlined in the National Plan of Action for Gender Equality 2017–2020, which the Ministry of Labour and Social Protection implements. The main tool for implementing the State policy on employment⁹ is subprogramme 1, "Promotion of employment", of the State Programme on Social Protection and Promotion of Employment for 2016–2020, highlighting several measures aimed at increasing women's rate of labour-force participation. In 2018, subsidies to start a business were provided to 761 unemployed women (44.3 per cent of all unemployed people who received a subsidy), and entrepreneurship training was provided to 494 women (64.9 per cent of all number of women who received subsidies). The legislation was examined by the National Centre for Legislation and Legal Studies to ensure the elimination of all norms discriminating against women.

Despite the lack of a dedicated initiative, the Belarusian economy fares well in terms of gender equality. The share of women business owners has been growing over time (chapter II), and women are becoming more actively involved with innovation. This is reflected in international studies, including the 2019 GII ranking of Belarus on the number of women employed who have advanced degrees (first globally), and the EBRD's BEEPS data on the share of companies with female owners who introduce innovations (43.5 per cent) and new products and services (55.1 per cent). Nonetheless, impediments to income equality persist. Potential drivers include a list of professions prohibited to women, as well as social stereotypes and gender roles.

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ The Government has expanded the innovation support infrastructure, stimulating innovative activity, supporting the creation of synergies and fostering business networking.
- ✓ An assessment framework for clusters makes it possible to identify potential networks and initiatives.
- ✓ Gender-disaggregated data allow effective monitoring and policy evaluation considering equality principles.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy support in science-industry collaboration does not sufficiently cover issues such as limited mobility and scarce industry-research networks. 	<ul style="list-style-type: none"> ✓ Expand the cooperation between representatives of the scientific community and industry by developing effective interaction mechanisms (for example, industrial PhD programmes, sabbatical leaves, industry-funded research chairs). 	Medium-term	SCST Ministry of Education Ministry of Industry
	<ul style="list-style-type: none"> ✓ Set up a monitoring framework for linkages and collaboration between enterprises and public R&D institutions that undertake innovation activity. 	Short-term	SCST
<ul style="list-style-type: none"> • Financial support instruments for collaborative projects between industry and academia do not attract sufficient interest from qualified applicants. 	<ul style="list-style-type: none"> ✓ Award unconditional financial support for innovative projects, to expand the pool of applicants and the impact of the scheme on innovative development. 	Medium-term	SCST BIF
	<ul style="list-style-type: none"> ✓ Introduce a financial instrument that helps defray innovation-related risk, and promote more experimentation (for example, venture capital funding, co-financing). 		
	<ul style="list-style-type: none"> ✓ Develop a set of pilot projects based on the innovation voucher scheme to demonstrate the potentials and functionality of collaborative work and expand the pool of applicants (for example, through innovation success stories, university seminars). 	Short-term	
<ul style="list-style-type: none"> • Policy support to harness the potential of the Belarusian diaspora is not yet consolidated in a dedicated scheme. 	<ul style="list-style-type: none"> ✓ Develop a dedicated programme for cooperation and joint activities with the Belarusian diaspora to create linkages with compatriots living abroad and draw from international experience. 	Medium-term	SCST NAS Belarusian Republican Foundation for Fundamental Research
	<ul style="list-style-type: none"> ✓ Offer incentives for Belarusian scientists to work on co-publications with compatriots living abroad. 		

Source: UNECE.

Sub-pillar IV: Knowledge diffusion

Mechanisms that ensure equal and widespread access to information are vital to creating an innovative ecosystem in both the public and the private sector, serving as channels for the distribution and intersectoral flow of information.

Brokerage services for technology upgrading

A coordinated scheme for brokerage services for technology upgrading is not implemented at the national level in Belarus, yet separate initiatives contribute partially in this area. The Republican Confederation of Entrepreneurship organizes seminars, forums, international brokerage and business matchmaking events.¹⁰ Also, some technology transfer centres at universities provide scientific support for implementing innovative activities, along with exhibitions, fairs and direct transaction assistance. Technology offers and requests are listed on the RCTT's website, facilitating links between entrepreneurs and public research institutions.

Public procurement for innovation

The system of public procurement for innovation presents challenges for scientific and technical development in Belarus. Specifically, the Law on State Innovation Policy (2012) outlines the stimulation of innovative activity through public procurement as a potential support measure, yet implementation of such stimulus has not begun. The general complexity of the public procurement system is identified as a main obstruction in this regard. To avoid having pricing policies hinder entrepreneurs' access to the market, fair competition practices need to be further ensured.

Digitalization and e-governance

The rapid growth of the IT sector in Belarus suggests the ample potential for the digital transformation of the country: in 2018, exports from the HTP grew by 38 per cent. Thus, the need to train highly skilled specialists in IT management and digital processes is growing, but is not yet sufficiently addressed. Moreover, the development of the Belarusian software industry has not yet led to digitalization of industry and the economy. Therefore, digital information, communication and interdisciplinary technologies are a priority area for national science and technology policy supporting innovation (Belarus, Institute of Economics of the NAS, 2019a). Specifically, the development of broadband infrastructure was among the objectives of the State Programme for the Development of the Digital Economy and the Information Society for 2016–2020. Despite promising developments (chapter II), further efforts are needed to ensure full-scale regional connectivity. Regular improvement of the unified portal of e-services (launched in 2003) contributes to the development of full-fledged e-governance, and plans are under way to create a national open data portal for government agencies and organizations to host publicly available information. Access to data is also enabled through the open statistics database provided by the National Statistical Committee.

Other policy tools

The existing policy tools do not sufficiently address present gaps in knowledge diffusion in Belarus with regard to leveraging the potential of standards, testing and certification instruments for SMEs and industrial technological assistance. Nevertheless, the State Committee for Standardization of the Republic of Belarus (Gosstandart) has made efforts to provide both mandatory and voluntary conformity legislation in the form of assessments, to ensure the conformity of products and processes with technical specifications and national and international standards, in line with the technical normative legal acts. Similarly, according to the SCST, some science and technology parks have made efforts towards providing industrial technology assistance (see table IV.4), by establishing technology parks for instance in the IT sector, with support from the HTP (SCST, 2018).

Sub-pillar IV IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> Policy support for developing the digital economy has contributed to improved e-governance and access to data. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The existing policy support tools do not sufficiently address issues that hinder public procurement of innovation in the public sector, impeding the competitiveness of innovative goods and services. 	<ul style="list-style-type: none"> Stimulate innovative development on the demand side through public procurement (for example, consider adopting a pre-commercial procurement approach to drive the development of innovative solutions according to the public sector's needs). 	Medium-term	Ministry of Antimonopoly Regulation and Trade
<ul style="list-style-type: none"> Stimulation of R&D and innovation is not incorporated in the State procurement system. 	<ul style="list-style-type: none"> Amend the national procurement legislation, selecting performers of R&D activities (funded in whole or part from the State budget) in accordance with the results of the State scientific evaluation. 	Short-term	SCST Ministry of Antimonopoly Regulation and Trade
<ul style="list-style-type: none"> Ad hoc initiatives providing industrial technology assistance and brokerage services for technology upgrading are not sufficiently matched to the needs of innovative SMEs. 	<ul style="list-style-type: none"> Foster technological modernization in SME production processes by integrating relevant industrial technology assistance in the service portfolio of science and technology parks (for example, market intelligence services, technical assistance, mentoring). 	Short-term	SCST
<ul style="list-style-type: none"> Policy efforts do not sufficiently ensure that high-quality IT education and training are available to the growing pool of professionals seeking employment in the IT sector. 	<ul style="list-style-type: none"> Expand the IT training base to foster a new generation of specialists and enable the digital transformation of the economy (for example, through a specialized IT education institution or an educational programme on IT and digital transformation for managers). 	Medium-term	Ministry of Education, Hi-Tech Park

Source: UNECE.

Sub-pillar V: Research and education

Recognizing the requirements of today's labour markets and rapidly evolving technological environment, governments have pursued a multidisciplinary approach to education through science, technology, engineering and mathematics (STEM) initiatives. Policy measures to enhance research are designed to promote research excellence, collaboration and commercialization.

Policies to increase the number of STEM graduates

According to Belstat's annual report on education in the country, 33.1 per cent of total enrolment¹¹ in 2018 was in STEM disciplines (Belstat, 2019). The State programme "Education and Youth Policy" and the State Programme for Innovative Development 2016–2020 include measures to increase the number of STEM graduates, including student exchange programmes, teacher industry placements and seminars by lead experts in the innovation sphere. In 2018 the Ministry of Education launched a pilot project, "Improving the activities of higher-education institutions based on the University 3.0 Model", adding a systematic interconnected study of innovation and entrepreneurship to the education programmes at HEIs, as well as high-tech projects in the framework of science-oriented training. STEM education in Belarus is further supported by the non-governmental sector: The Education for Future association, which has supported the STEM infrastructure in secondary education since its establishment in 2017, has created a network of 14 STEM centres. The association runs national STEM competitions, offers teacher training modules and envisages the establishment of STEM hubs at universities to support industry-science linkages, regional development and increased student enrolment in STEM-related fields at HEIs.

Policies to foster research development

Research funding in Belarus is based on a broad regulatory framework and is allocated in accordance with a five-year cycle of State programmes to support scientific and innovative activities (currently in the period 2016–2020). In 2018, R&D expenditure accounted for 0.61 per cent of GDP with funds spent on experimental development (60.5 per cent), applied research (27.4 per cent) and fundamental (12.2 per cent) research. Of note is a trend of distributional changes observed in the period 2015–2018, marked by increased expenditures for experimental development on account of reduced spending for basic research (Belarus, Institute of Economics of the NAS, 2019b). This signifies that a critical mass of activities with ample potential for commercialization exists in Belarus, unlike in other countries at the same level of development. Central to innovation is the State Programme for Innovative Development (2016–2020) implemented by the SCST, which includes objectives to improve innovation policy governance, tools and processes in the country. Also in place are the State programmes for scientific research and for science and technology: 16 SSRPs and 17 SSTPs on the basis of approved priority areas, providing non-repayable funding to R&D projects.¹² Research organizations, however, often face difficulties in obtaining project financing, while stimulus for innovation activity in the public sector (for example, grants, scholarships) is scarce. According to the analytical

report on the scientific development of Belarus in 2017 (UNECE, 2017), 0.2 per cent of GDP was allocated to STI activity from the central government budget, out of which funding for innovative projects amounted to merely 1 per cent.¹³ In 2017, the Council of Ministers approved a framework for competitive funding provided from the Republican Central Innovation Fund, which is a positive development in this direction.

Cross-border research cooperation is one of the priorities of the NAS, which currently comprises 38 joint international centres and 75 research institutes. Since 2017, the NAS has also been the headquarters of the International Association of Academies of Sciences, which has 15 full members including all national academies of the EESC sub-region. Belarusian researchers can also apply for funding through the Horizon 2020 programme, and the SCST each year announces calls for bilateral international projects with selected partner countries. In addition, best practices in research and innovation are continuously identified, drawing on intensive historical cooperation with EU member states, the Russian Federation, former members of the Commonwealth of Independent States and other countries worldwide. For instance, the Institute of Economics of the NAS has recently performed a number of studies to identify levers for innovation development, drawing on the Chinese experience in innovative entrepreneurship (Belarus, Institute of Economics of the NAS, 2019b), infrastructure (Belarus, Institute of Economics of the NAS, 2019c), and commercialization (Belarus, Institute of Economics of the NAS, 2019a).

Sub-pillar V IPO evaluation and recommendations

Achievements

- ✓ Policy efforts have been made to increase the emphasis of university curricula on STEM-related fields and to develop innovation infrastructure at Belarusian HEIs so as to boost research commercialization.
 - ✓ Regular monitoring of State programmes in research, science and technology allows for identification of potential inefficiencies and continuous improvement.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy support to increase the number of STEM students is not consolidated in a dedicated scheme for stimulating STEM education. 	<ul style="list-style-type: none"> ✓ Promote STEM education by developing a dedicated scheme with an action plan, outlining specific activities and incentives, including promotional instruments (for example, national STEM camps, competitions, a virtual network) and financial instruments (for example, scholarships, State-funded places in STEM-related fields). 	Medium-term	Ministry of Education
<ul style="list-style-type: none"> • The separation of State programmes for developing STI hides the potential risks of inefficiencies and fragmentation in terms of implementing set objectives. 	<ul style="list-style-type: none"> ✓ Leverage the well-developed monitoring system to conduct a comprehensive assessment of State programmes in innovation, science and technology to identify potential overlaps and improvements. ✓ Consolidate STI development objectives. 	Medium-term	SCST NAS
<ul style="list-style-type: none"> • Existing policy measures have not led to a systematic exploration of the commercialization potential of outputs from the public research system. 	<ul style="list-style-type: none"> ✓ Expand the incentives for research and innovation to promote innovative activity in the public sector by offering additional incentives for commercialization (for example, competitive grants for selected projects and scholarships for young researchers) and ensure good working conditions (for example, modern equipment, fair remuneration). 	Medium-term	SCST Ministry of Education

Source: UNECE.

Notes

- ¹ The pool of trainees consists of 50 categories of management personnel from various state bodies and SOEs.
- ² Examples include the Belarusian Chamber of Commerce and Industry and the Republican Confederation of Entrepreneurship.
- ³ The GSIP was founded by an investment partnership between China and Belarus. The main shareholders are China National Machinery Industry Corporation (SINOMACH), China Merchants Group, China CAMC Engineering Co., Ltd., Harbin Investment Group Co., Ltd., Great Stone Industrial Park Administration and Duisburger Hafen AG.
- ⁴ BIF initiatives are implemented under the management of the State Committee on Science and Technology (SCST). For the period 2010–2018, 15 winners obtained commercialization certificates in the National Innovation Competition.
- ⁵ The project is implemented by the Ministry of Economy of the Republic of Belarus jointly with UNDP.
- ⁶ The RBF was established in December 2016 as an investment partnership by Belinfond (50 per cent), the Russian Venture Company (RVC) (50 per cent) and RVC Infracfund (1 per cent).
- ⁷ The RCTT was established in 2003 under the aegis of the SCST, the NAS, UNDP, and UNIDO.
- ⁸ The project BCC "EEN Belarus" was prepared by RCTT and the Republican Confederation of Entrepreneurship with the participation of the Centre of System Analysis and Strategic Research (CSASR) and the Belarusian Institute of System Analysis (BelISA).
- ⁹ The Law of the Republic of Belarus "On Employment of the Population of the Republic of Belarus" No. 125-Z, 2006.
- ¹⁰ The initiators of the RCE are the Minsk Capital Union of Entrepreneurs and Employers; regional business associations of Brest, Vitebsk, Grodno and Mogilev; the Republican Trade Union Sadruzhnast; regional Centres for Entrepreneurship Support; and a number of foundations, public associations and other organizations.
- ¹¹ The reported share consists of 20.4 per cent in technical disciplines and 12.7 per cent in physics, mathematics, chemistry, biology and earth sciences.
- ¹² In addition, 11 sectoral and 6 regional programmes for science and technology are active.
- ¹³ The low share attributed to innovation projects markedly implies exclusion of national innovation funds, such as the BIF.

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Chapter V

PILLAR III: INNOVATION POLICY PROCESSES

Pillar III examines the underlying processes for innovation policymaking: how data, evidence and stakeholder input inform how decisions are made, put into practice, monitored and evaluated. Ten detailed policy indicators address each step in the policy process, from problem identification or market failure to policy design, implementation, evaluation, impact assessment and learning.

In consultation with the SCST of Belarus, UNECE selected the SSTPs for assessment, on the basis of these criteria:

- i) The policy measure is intended to foster science, technology and innovation (STI) in the country.*
- ii) The policy measure reflects the standard innovation policy practices in the country.*

Pillar III also derives broader policy lessons for innovation policymaking.

Innovation policy processes – strengths and weaknesses

Government decision-making in Belarus is top-down. The planning and decision-making process of the SSTPs is well structured, as is the application and selection process. The private sector plays a limited role in their implementation, and public scrutiny of government work and participation in policy design are limited across the bodies responsible for STI policymaking. A positive development has been the adoption of the Law on Regulatory Acts (2018), which introduced regulatory impact assessment (RIA) in the process of preparing legal acts.

One of the biggest challenges for Belarus is to move from promoting technology development, which is done through industrial policy, towards promoting innovation, where the risk component of the projects financed is more important. The risk-averse aspects of the SSTPs reduce the potential for innovation. Several mechanisms have been established throughout the course of the SSTPs to monitor and evaluate them.

Overall, however, monitoring and evaluation practices across ministries and State committees still have little systemic linkage to policy design.

Policy overall: science and technology programmes (grants)

Science and technology programmes – more commonly referred to as public grant schemes for innovation and/or R&D projects – are the most common type of funding instruments used by policymakers to address innovation-related market and system failures, such as failures of coordination and capability. Grants within such programmes vary in their size, duration, eligibility requirements (such as R&D, commercialization, collaborative innovation and purchase of equipment or services), payment procedures, repayment requirements and delivery mechanisms. Most grant types are competitively based and usually target science-industry collaboration (World Bank, 2020).

Country experiences reveal several good practices for effective grant scheme design and implementation:

- Eligibility and selection criteria need to be clear. The types of activities and expenditures eligible for support should also be specified.
- The broader national objectives should be reflected in the selection criteria and the specific objectives (World Bank, 2010). Providing grants to collaborative projects that involve firms with limited R&D experience could increase the number of SMEs performing R&D in the long term. Yet, if the objective is to increase investment by firms in R&D, the target should include economic actors that have R&D experience (Caloffi et al., 2019).
- Competitively based allocation of funds makes possible improvements in performance, unlike direct institutional allocations (Jacob, 2013).
- Marketing grants to potential beneficiaries is essential to avoid creating a small group of actors dependent on grants (World Bank, 2020).
- Automating grant application, selection and management (for example, through smart forms, standardized contracts and online applications, reporting and payments) would reduce the burden of participation for firms. Studies show that, unlike researchers, firms – particularly small ones – generally lack both the necessary resources and experience in applying for grants (World Bank, 2020).
- Transparent decision-making processes are essential. Applications should be assessed by independent experts or through a committee, both free of political interference. Maintaining separate units for policy-setting, technical evaluation, management and governance are good practices (World Bank, 2010).
- The monitoring and evaluation process should be used for learning and adapting the funding mechanism as needed (World Bank, 2020).

Policy focus: the SSTPs

The SSTPs are one of the most comprehensive funding mechanisms in Belarus to support applied R&D in specific priority areas. They provide approximately 30 per cent of public research funding. Altogether, they are the means to reach the indicators set up in the Programme of Social and Economic Development, which is approved for five-year periods.

The SSTPs primarily aim at funding small innovation projects and applied R&D in Belarus, which, in sum, are supposed to help solve national economic problems and, individually, aim to promote linkages between academia and business. The scheme is administered by the SCST, which makes the call for proposals and coordinates the evaluation of applications and selection of beneficiaries.

The SSTPs are developed for five-year periods, usually with two years (but no more than three) allocated for R&D and design and three years for the production cycle and commercialization of the project. The SSTPs are structured around subprogrammes (17 subprogrammes in the 2016–2020 financing cycle), which are based on the list of priority scientific and technical activities in the Presidential Decree. Subprogrammes in turn include several “tasks” (projects) that receive grants. The amount of such grants is not predetermined and is proposed by applicants. In the current cycle, the amounts range from \$12 million to \$730 million.

The SSTPs have two funding modalities. For those considered to make a strong social contribution (for example, in health), the R&D stage is financed from the government budget. In all other cases, the government budget covers up to 50 per cent of the R&D costs, while the other part is funded from non-budget sources (end users, beneficiary’s own funds, investors, and the like). The budget contribution can originate from the republican budget (on the line “Financing science, technology and innovation activities”), the local (oblast) budget or the Republican Centralized Innovation Fund. The commercialization stage which includes the launch of serial production of new products piloted and tested at the R&D and design stages, is financed from non-budget sources and the Fund.

Grants can cover the following expenses:

- Materials and accessories
- Salaries of researchers and developers
- Social insurance contributions
- Business trips of researchers and developers
- Works and services of third-party organizations and individual entrepreneurs
- Overhead costs

Between 1996 and 2016, the number of SSTPs constantly decreased. The design of State measures to improve their effectiveness has focused on strengthening control over the progress of work.

Table V.1 Overview of sub-pillars and indicators for innovation policy processes

Sub-pillar I: Preparation	Sub-pillar II: Design	Sub-pillar III: Implementation	Sub-pillar IV: Post-implementation
Innovation foresight	Planning	Amendment of policies	Ex-post evaluation
Rationale	Decision-making	Review of the policy against its action plan	Adaptation
	Private sector consultation		
	Coherence		

Source: UNECE.

Sub-pillar I: Preparation

Sound preparation of policies sets the foundation for the policymaking process. Public intervention should depend on the identification of market failures as well as future trends that will affect the area of intervention.

In the transition to a knowledge-based economy, Belarus needs to combine its sustained growth, diversified exports and growing ICT sector with a flexible support system and an enabling business environment that foster the development and realization of innovative ideas (chapter II). In this context, there is a strong policy rationale for the implementation of science and technology programmes. The preparation of the SSTPs for the upcoming five-year implementation cycle is carried out on the basis of the priority directions of scientific and technical activity. Altogether, they are the means to reach the indicators established in the Programme of Social and Economic Development.

Innovation foresight

Until recently, foresight played a limited role in the planning of this process. Nevertheless, some elements of forecasting were used to define the national science and technology priorities and the SSTPs: since the late 1990s, jointly with the NAS, the SCST has developed national forecasts of science and technology trends that support the conceptualization of policy documents by government institutions. It assesses and analyses indicators and their values for the real sector of the economy in order to select the topics for the SSTPs. In 2019, a more comprehensive forecast was developed of scientific and technological progress for 2021–2025 and until 2040. Priority areas of scientific, technological and innovation activities for 2021–2025 were approved by the President in May 2020 and hence the resulting SSTPs are closely linked to the outcomes of this forecast.

Thus, foresight takes place in Belarus but tends to be ad hoc and is not subject to continuous revision and impact assessment. This state of affairs means that individual innovation policy measures may not be grounded in agreed, realistic assumptions from which the key performance indicators (KPIs) follow in some fashion, and it is not possible to monitor and evaluate at the impact level in a concerted fashion.

Policy rationale

The SSTPs were conceived in the mid-1990s and initially modelled on the Soviet Union's Republican Science and Technology Programmes. After independence, they were addressed in Paragraph 11, Scientific and technical programmes, in Law No. 2105-XII, "About fundamentals of the State scientific and technical policy" (19 January 1993). The rationale was "to implement the State scientific and technical policy in priority areas of State, sectoral, regional, interstate scientific and technical activities". The first list of scientific and technical programmes for 1993–1995 was formed at a time when the Government lacked clear ideas about the scientific priorities of the new republic. As a basis, it used the direction of research carried out in the Soviet Union in the framework of the Republican Science and Technology Programmes for the 13th five-year plan (1991–1995). As a result, the list included 34 programmes.

Although the Government designs scientific priorities today more comprehensively, at that time it conducted no market failure analysis to validate the implementation of the SSTPs. In terms of ex-ante evaluation, according to the Regulation of the Council of Ministers Decision No. 961, 31.08.2005, each draft SSTP should contain a forecast of the social and economic effectiveness of the proposed programme – for the programme as a whole, as well as for each task. Feasibility studies are also conducted.

Broader policy issues

In a positive development, the adoption of Law No. 130-3, “On Normative Legal Acts” (17 July 2018) introduced RIA in the process of preparing legal acts. Several RIA methodologies have been developed. The National Centre for Legislation and Legal Research has been assigned the task of preparing guidelines on the procedures for RIA and for legal monitoring of implementation (Forbici and Lovitt, 2018). It is not yet clear how comprehensive and meaningful the RIA process will be; however, its full implementation would allow policymakers to predict the impact of State legal regulations and reveal excessive liabilities, prohibitions and restrictions of regulations, as well as unreasonable expenditures of economic entities, and on that basis make the most objective legal decisions (Belyaev and Mordosevich, 2017).

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Some technology foresight practices take place, to define the priority areas of the SSTPs and other innovation policy documents. ✓ The Government passed a law that introduces RIA in the process of preparing legal acts. <ul style="list-style-type: none"> ✓ Several RIA methodologies have been developed. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Foresight practices occur ad hoc. 	<ul style="list-style-type: none"> ✓ Integrate technology foresight practices into the policy processes in relevant line ministries and State committees to capture future trends and perspectives for research activities that are subsequently incorporated or adjusted in a long-term strategic direction of its innovation development. Foresight should also be re-focused on financing innovation rather than modernizing or developing technology. 	Medium-term	SCST MoE Ministry of Industry Other line ministries
	<ul style="list-style-type: none"> ✓ Set up a full-scale national foresight centre to serve the needs of line ministries as well as big companies. 		
<ul style="list-style-type: none"> • The pilot RIA needs follow-up. 	<ul style="list-style-type: none"> ✓ Build on the efforts and experiences from piloting RIA by elaborating a timeline and a plan to institutionalize and implement RIA to ensure that evidence-based policymaking is established and carried out systematically when drafting new policies and laws. The RIA methodology should incorporate good practices, such as those elaborated by the OECD (2008); this may require an amendment to the Law on Normative Legal Acts. 	Medium-term	National Centre for Legislation and Legal Research of Belarus Executive authorities
<ul style="list-style-type: none"> • Guidelines for RIA and systematic application of RIA are both lacking. 	<ul style="list-style-type: none"> ✓ Establish consistent but light-touch guidelines for RIA and concretely define how RIA is applied during policymaking. 	Medium-term	Executive authorities

Source: UNECE.

Sub-pillar II: Design

Public-private consultations are an integral part of the policy design process, to ensure policy relevance to the market and private sector needs and to confirm the commitment of relevant stakeholders to implementing it. Innovation policy is a supplementary component of a country's overarching strategy that contributes to the achievement of the broader vision and objectives of socioeconomic development. Its priorities and activities should be consistent and coherent with relevant "non-innovation" policies.

Planning

The planning and decision-making of the SSTPs occurs in two tiers: a call for SSTPs and a call for projects. In simple terms, the SCST launches a call for proposals and comes up with a draft list of SSTPs on the basis of proposals from State customers and the priority areas of science and innovation activities approved by the President. It then submits this list to the Government for approval.

In more detail, the procedure follows these steps:

- State customers generate proposals for SSTPs. Upon passing through sector examination councils at State customers, draft SSTPs are submitted to the SCST through the e-system "Single Examination" for evaluation.
- Thematic councils consider the draft SSTPs that pass the evaluation. Under a decision of the Government (Regulation of the Council of Ministers No. 431 of 22.05.2015), BellSA manages a large database of experts and 12 topic-specific councils of these experts. Membership of the councils is regularly updated, with new experts from the database rotating onto the councils. The outcome of the council's consideration is a recommendation for the SCST about including the draft SSTPs.
- After receiving the State evaluations, the SCST selects the SSTPs, in close coordination with the State customers and through numerous discussions in working groups, the Collegium of the SCST, a joint meeting of the Praesidium of the NAS and the Collegium of the SCST, and other fora.
- After consensus is reached on the list of SSTPs, the SCST presents the draft Government's decision to the Commission on the State S&T Policy at the Council of Ministers, which is chaired by the Prime Minister. The Commission approves or disapproves the draft Government's decision. If approved, the SCST submits the draft decision to the Council of Ministers.
- The Council of Ministers adopts the list of SSTPs through a regulation, a signal for State customers and executers to move to the second tier, the call for tasks.

In this tier, the SCST launches an open call for R&D projects (tasks). Applicants develop project proposals and submit them to the lead executing organization of the pertinent SSTP. The lead executing organization presents the submitted applications to the State customer.

- The branch scientific and technical council of a State customer pre-selects projects; the State customer presents those projects to the SCST for independent science and technology evaluation by the State, as done for the draft SSTPs.
- State expert (thematic) councils carry out independent science and technology evaluations and recommend funding.
- The SCST approves the list of projects (tasks) for each SSTP, including the funding. It then allocates the funding to the executors for a period of up to three years to conduct the R&D.
- Upon completing the R&D stage, State customers introduce the results or commercialize and sell them within the next three years.
- If the agreed sales targets are not attained, funds are expected to be returned in part to the budget.

The application and selection process for SSTPs and tasks is clearly defined in the Government's regulations and available at the websites of the SCST and State customers, as well as on the national legal portal, <http://pravo.by> (Belarus, Council of Ministers, 2005). Each SSTP has a plan that defines the scope of work; in addition, each has an R&D workplan with concrete results identified and a plan for development and implementation that includes clear deadlines, for both the volume of output and the money equivalent.

Public-private consultation

A range of stakeholders are involved in shaping the SSTPs at the stages of evaluating and selecting the programmes and their tasks:

- Expert scientific and technical councils created under State customers.
- Experts who work as evaluators of projects (representatives of academic, higher education and branch sciences, as well as specialists of industrial organizations, including private companies).
- State (thematic) councils of experts created by the SCST.
- The Commission on State S&T Policy, which discusses and agrees on the most important political decisions (such as priorities and the list of SSTPs) before submitting them to the Council of Ministers for approval.

Thus, individual tasks are subject to three levels of expert examination, which involves at least 25 scientists and business representatives who are part of the State-owned or -affiliated groups.

State governing bodies (line ministries and committees) and the NAS also participate in developing and designing the SSTPs and pre-selecting projects. They also act as their State customers. In many cases, the majority of projects within an SSTP are implemented by R&D centres that are subordinate to the same State customer that "owns" the programme. This makes the monitoring of the projects and programme implementation easier and, probably, more effective; however, State customers may not be completely neutral in this scenario, as they may take into account the interests of their own R&D institutions and companies first. The NAS, for example, undertakes policymaking, programme design, project implementation and monitoring. Under international good practices of many

EU member states, an intermediary body should act between the policymakers and/or programme owners and the R&D and/or business players.

Involvement of international experts in the State evaluation is not obligatory; however, it is welcome. To improve the quality of applications, applicants can ask for a consultation and advice from an SSTP managing team hosted by a lead executor. The work of the managing team is covered by the SSTP budget.

Policy coherence

Although the Government has articulated strategic priorities in R&D and innovative development and has a long-standing system for implementing the SSTPs, the continuing orientation of RDI policy recognizes the need to enhance complementarities between the SSTPs and strategic priorities (UNECE, 2017). In fact, the SSTPs are a subset of scientific programmes that are supposed to be consistent with the State Programme of Innovative Development; according to interviews with stakeholders, however, this is not the case. Innovative projects in the innovative development programme ideally should be based on the results of the SSTPs, but this is also not always the case yet. Ideally, the programme would include the implementation of projects previously elaborated within the SSTP, but in fact the programme contains strategic technological initiatives such as a nuclear power plant. Whereas the source of projects in the SSTP may be the initiative of executors, the source of projects in the State Programme of Innovative Development is national and State priorities and the nature of the projects in the programme is not in fact R&D.

Broader policy issues

Public scrutiny of Government work and participation in policy design could be enhanced in Belarus across the bodies responsible for STI policymaking. There are no official obligations to consult publicly on new policy proposals, as stated by Law No. 130-3, "On normative legal acts" (17.07.2018). Policy drafting institutions decide whether to open the draft decision for consultation by the general public. If they do so, the proposal is placed in an online forum (<https://forumpravo.by>) or the website of the public body that developed the policy.

Overall, the views and interests of private, non-State economic actors are not sufficiently taken into account in the management of the national innovation system. To discuss draft regulations developed by executive authorities, as well as problematic issues arising for legal entities and individuals in the course of entrepreneurial activity in the STI sphere, the SCST established the Public Advisory Council in 2011. Ten of 19 members of the current Council represent business, both private and State owned.

Interdepartmental and interministerial coordination is obligatory while developing a policy (Law No. 130-3, art. 36; 17.07.2018). If a policy is initiated by a ministry or committee, the initiating body defines the list of public bodies with which the draft policy should be coordinated. In STI policy, the obligatory institutions to consult include the MoE, the NAS and the Ministry of Justice. Additional coordination depends on the content of the policy proposed. When the request to develop a policy comes from the Council of Ministers or the President, the list of public bodies to consult is usually defined by the Government or by the President's Administration.

After the consultations, the lead ministry collects and incorporates the feedback in the draft. The initiator and developer of a policy must take into account the opinions of the public bodies received in the coordination process. In case of disagreement, the public bodies involved coordinate through meetings and working groups to come to a common understanding. If they do not reach agreement, the issue is elevated to a higher level (such as the Council of Ministers).

Sub-pillar II		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Political support for enhancing innovative activity in Belarus is active and high-level; this creates favourable conditions for the design of effective measures for implementing SSTPs. ✓ Coaching is available for SSTP applicants to improve the quality of their applications. ✓ The focus on the social returns of SSTPs is strong. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The private sector has only limited involvement in the SSTPs and the design of innovation policy. 	<ul style="list-style-type: none"> ✓ Develop and pilot a concerted approach to consultations with the private sector and the broader public on the design and implementation of the SSTPs, as well as innovation policy as part of the broader, regular policy cycle and decision-making processes. 	Medium-term	SCST Executive authorities
<ul style="list-style-type: none"> • Greater consistency is needed between the objectives of the State Programme on Innovative Development and the implementation of the SSTPs. 	<ul style="list-style-type: none"> ✓ Align the implementation of the SSTPs more closely with the objectives of the State Programme for Innovative Development, including the allocation of public funds. The joint Inter-agency Funding Committee could perform coordination functions in this regard (UNECE, 2017). 	Short-term	SCST
<ul style="list-style-type: none"> • State actors operate both as developers of proposals for the SSTPs and as State customers, which may create a conflict of interest. 	<ul style="list-style-type: none"> ✓ Set up an intermediary body to act between the programme owners (policymakers) and the executors of tasks (R&D and/or business players). 	Short-term	SCST

Source: UNECE.

Sub-pillar III: Implementation

Targets and time frames defined in the action plan provide a basis for regular reviews of implementation progress. Analysis of intermediate progress helps identify administrative, institutional and technical challenges faced during implementation and makes it possible to undertake necessary measures, including adjusting activity and reallocating resources.

Review of the policy against its action plan

The SSTPs have a long track record of improving implementation. The analysis found that the operational part of the SSTPs has been well organized, with comprehensive

instructions on a dedicated portal (Belarus, Council of Ministers, 2005) and a transparent selection process. Between 1996 and 2016, the number of SSTPs decreased steadily (from 48 to 17). Stakeholders consider the decrease as a positive trend, as a smaller number of programmes helped concentrate large resources in priority areas. During the same time, the number of scientific and technical tasks almost doubled. Overall, the share of public funds in programme financing has also decreased, with more customers providing co-financing, as has the share of unfulfilled tasks on the SSTP. Targeted and comprehensive marketing and promotion of the SSTP scheme so as to maximize the number of qualified applications have been priorities. A marketing strategy to this end was implemented through various media channels, with clear and accessible messaging.

Beneficiaries can freely spend the grant money to purchase equipment and select service providers in the market. Under the legislation, budget funds received by executors on the basis of civil law contracts for two kinds of entities – State-owned organizations and business entities in which the State has more than 25 per cent of the share capital – are extrabudgetary funds. These funds are thus spent like the beneficiaries' own funds. As a result, the conditions and procedures are equal for public and private players.

The IPO analysis points to a number of potential areas for improvement, from estimating targets to liability for not fulfilling production obligations. The design of State measures to improve the effectiveness of the SSTPs has focused on strengthening control over the progress of work. If tasks are not completely implemented, the contractor bears a proportional financial responsibility. This approach may have led to underestimation of target setting by customers as funding for research is accepted only with a high degree of certainty. Often projects aim to improve existing products and technologies, which may not produce a technological breakthrough. Contractors may be incentivized to lower the level of expected results or to turn down risky projects (Stefanin, 2009).

Some changes in the procedure for implementing the SSTPs are starting to come into effect. For the first time, circumstances have been defined that exempt the executor from liability if it does not fulfil the obligation to produce innovative products. These circumstances include emergency situations, adoption of legislative acts, decisions of international organizations prohibiting or restricting the production or sale of certain goods and liquidation of a legal entity producing goods based on innovation. Nonetheless, these are mostly external reasons: so far, no allowance is made for mistakes by developers and proposals must provide the expected outcomes.

In addition, innovations produced through the SSTPs are not supported by public procurement, which is a powerful instrument for enhancing innovation in many countries. The legal framework for public procurement in Belarus is developed independently from innovation policy; as such, innovation requirements seldom appear in public tenders.

Broader policy issues

When implementing the tasks, small private enterprises and foreign companies practically do not participate, although both can play a key role in developing the competitiveness of the national economy. Attracting private companies to participate in competitions would help to reduce the cost of development and boost scientific and technical capacities to implement technologies and products (Stefanin, 2009).

Practical experience has indicated that further reforms are needed for the efficient management of IPRs. In particular, although the legal framework seems to contain sufficient provisions for identifying the legal owners of the IPRs originating from R&D activity supported by public funding, the implementation of those provisions is not carried out effectively. Because of ambiguities, even the leading R&D institutes performing science and technology projects under the SSTPs face difficulties in claiming legal ownership of their IPRs (UNECE, 2017).

Another issue is that most executors are State bodies, whereas most customers are State-owned enterprises. These two stakeholders have strong inherent links and a history of cooperation, so they usually agree on a task before the State bodies apply for funding. This means that competition during the selection process is limited and the executors are mostly the same from one competition to the next.

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ Belarus has a long track record of implementing the SSTPs.
- ✓ The operational part of the SSTPs is well structured, with comprehensive instructions on a dedicated portal and a transparent selection process.
- ✓ SSTP resources concentrate in priority areas of research and technological development.
 - ✓ The share of public funds in SSTP task financing is decreasing, with more customers providing co-financing as a general trend.
- ✓ The ability of beneficiaries to freely purchase goods and services at the market is a demand-driven process and a good practice example compared with obligatory service provision by selected central public institutions.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The SSTPs need more focus on controlling the progress of work on SSTP tasks and the liability of customers if they do not complete tasks and attain targets. 	<ul style="list-style-type: none"> ✓ In cooperation with the NAS, identify in the SSTPs a separate category of high-risk STI aligned with the provisions of the Law on State Innovation Policy and Innovation Activities and funded by a different category of specific instruments that tolerate risk (UNECE, 2017). 	Short-term	SCST Executive bodies
	<ul style="list-style-type: none"> ✓ Assess the effectiveness of an SSTP as a whole, rather than at the task (project) level as it is done currently. This would allow for some flexibility for individual tasks to fail and others to succeed; outcomes of the programme as a whole would be in line with the predefined plans and success indicators. 		SCST Executive bodies
	<ul style="list-style-type: none"> ✓ Align the innovation policy priorities in the national legislation on public procurement in line with the international best practices, for example, the possibility of purchasing goods (works, services) resulting from SSTPs using the procurement procedure from a single source. 		SCST Ministry of Antimonopoly Regulation and Trade
<ul style="list-style-type: none"> • Private companies do not participate sufficiently as customers in SSTP tasks. 	<ul style="list-style-type: none"> ✓ Establish more active interaction of government bodies with the private sector in the formulation and implementation of the SSTPs. Promote the SSTPs to the private sector through targeted marketing and incentives. 	Short-term	SCST

Sub-pillar III		IPO evaluation and recommendations (Concluded)	
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Little international coordination occurs in implementing and promoting SSTPs. 	<ul style="list-style-type: none"> ✓ Provide the executors of tasks in SSTPs with additional grants for internationalizing, to cover costs related to disseminating results, participating in exhibitions, developing patent application, searching for partners for commercialization purposes abroad and so on. 	Medium-term	SCST
<ul style="list-style-type: none"> There is a lack of provisions for identifying the legal owners of the IPRs originating from R&D activity supported by public funding (UNECE, 2017). 	<ul style="list-style-type: none"> ✓ Establish the institutional and legal provisions for IPRs originating from R&D activity supported by public funding, with a focus on implementation modalities and the promotion and exchange of local best practices. 	Medium-term	SCST

Source: UNECE.

Sub-pillar IV: Post-implementation

Ex-post evaluation is completed after the implementation of the action plan and based on results rather than forecasts. It helps establish the impact of policy activities on the industry in general, on specific fields or on beneficiaries. In light of experience acquired during implementation, governments introduce necessary adjustments to innovation policy measures so as to better target new or established policy objectives.

Ex-post evaluation

Throughout the course of the SSTPs, a number of mechanisms have been established to monitor and evaluate them. One of the most important indices is an “efficiency index”, a ratio of the proceeds of products sold to the amount of budget funds spent on implementing a programme. A programme is considered effective if this index exceeds 5. The index is not stable: it depends on the number of tasks for which products are manufactured in a certain period; for example, according to BellSA, in 2019, for the SSTPs as a whole the efficiency index is 19.2.

In addition to the State customers that monitor the implementation as SSTP owners, the SCST may ask BellSA to monitor an SSTP on a permanent basis. The accomplishment of tasks is closely benchmarked against the targets initially set. The intermediary and final results of SSTP implementation are discussed at the meetings of the SCST Collegium; afterwards the SCST reports them to the Council of Ministers. This is done each year, whereas the more comprehensive analysis is conducted at the completion of the five-year budget and programme cycle.

A chapter on implementing science and technology programmes (State, sector and regional ones) is part of the annual analytical report, “On the State and Prospects of Science Development in the Republic of Belarus”, developed jointly by the SCST and the NAS

to inform the President, the Government, the scientific and outreach community, and society as a whole about progress and challenges.

The effectiveness of budget funding for implementing the SSTPs is checked from time to time by the Ministry of Finance, the Committee of State Control and the Prosecutor General and discussed by their boards. Guidelines for assessing the results of scientific and science and technology activities are regularly updated; however, there is no independent system for assessing SSTPs, and the monitoring mentioned here focuses on outputs. Impact assessments are also lacking.

Broader policy issues

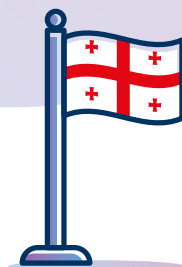
Beyond the SSTPs, monitoring and evaluation mechanisms are well integrated into the policy practices of executive authorities dealing with STI. One point for improvement is the limited link of monitoring and evaluation with the design of future policy.

Sub-pillar IV		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ A number of initiatives and mechanisms have been undertaken to evaluate the SSTPs. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Impact assessment of SSTPs is lacking. 	<ul style="list-style-type: none"> ✓ Ensure the independence of impact assessments, ideally by having them carried out by an external, independent assessor rather than internal staff. 	Short-term	SCST
<ul style="list-style-type: none"> • The link between monitoring and evaluation and future policy design is limited. 	<ul style="list-style-type: none"> ✓ Establish a more systemic linkage of monitoring and evaluation to policy design, including in government bodies responsible for STI policy. 	Medium-term	SCST Executive authorities

Source: UNECE.

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GEORGIA



Chapter I

ECONOMIC OVERVIEW

General overview

Georgia is a small, upper-middle-income country in the South Caucasus, connecting Europe to the Middle East and Central Asia. Since independence in 1991, the ensuing civil war and territorial disputes have made the transition to a market economy particularly challenging. Even so, Georgia is now one of the most open and easiest places to do business in the sub-region, with sustained albeit volatile growth. To continue to sustain growth and benefit from its manifold opportunities, however, Georgia needs to make better and systematic use of its potential, moving from a model of filling essential gaps to one based on broader experimentation with new and better ideas, business models, technology and governance arrangements.

Reform process

The radical improvement in Georgia stems from a series of far-reaching reforms. Following the Rose Revolution in 2003, structural changes in the institutional and legislative frameworks radically reduced petty corruption and improved the efficiency of government. Trade liberalization, including a range of free trade agreements, secured access to a diverse set of markets. Reforms of public financial management are under way, including the recently developed fiscal framework, changes in civil service pay and a transition to compulsory savings for retirement. As a result, Georgia has moved up quickly in the Ease of Doing Business ranking of the World Bank (2020a), reaching seventh place globally for regulatory performance. Although several efforts are under way, such as more investment into infrastructure, education and administration, further reforms are needed to restructure, diversify and increase the productivity of the economy.

GDP growth

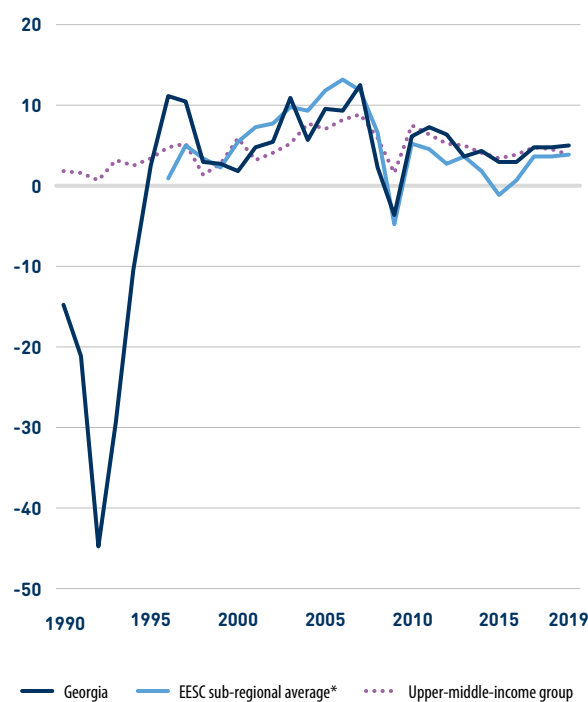
Since 2007 Georgia has maintained robust growth in GDP, at an average annual rate of 5.1 per cent (figure I.1), driven by enhanced productivity resulting from structural reallocation, high government spending and strong inflows from abroad (EBRD, 2018). As a result of reforms, gross domestic product (GDP) per capita in current U.S. dollars has increased from \$2,800 in 2009 to \$4,770 in 2019, while GDP per capita based on purchasing power parity (PPP) in current international US dollars has doubled, reaching \$15,636 in 2019 (World Bank, 2020b). The economy has demonstrated resilience in the face of external

shocks during this period: the global financial crisis, territorial disputes and now plummeting commodity prices.

As the gains of the first wave of structural reforms have been realized, however, productivity has declined. Looking at the time trends of different elements of GDP, it is evident that capital formation has contributed the most to GDP in recent years, reaching almost 27 per cent in 2019. Continued growth relies more and more on accumulating capital in non-tradables, which drives up asset prices while failing to diversify the economy. The economy depends increasingly on remittances, which exceeded 12 per cent of GDP in 2019, exposing it again to external shocks, causing instability and driving consumption rather than investment.

Domestic demand drives the economy. Government spending has been over 25 per cent of GDP since 2010, and a recent flourishing of social spending has helped keep the percentage that high. The current account deficit of 5 per cent of GDP in 2019 exposed the economy even more to external shocks and it is expected to increase following the impact of the COVID pandemic.¹ As a result, fiscal space has become ever more constrained. Despite attaining upper-middle-income status, Georgia is still far from achieving broad-based prosperity at the frontier of economic performance, given the overly generous and broad tax exemptions, the inefficiency of State-owned enterprises and the lack of constraints on social spending, all of which impede sustainable economic growth.

Figure I.1 · Annual GDP growth, 1990–2019 (Per cent)



Source: UNECE, based on data from the World Bank (2020b).
*Missing values for Armenia, Azerbaijan and Belarus (1990), as well as the Republic of Moldova (1990–1995).

Foreign direct investment

Foreign direct investment (FDI) remains a key source of external financing for Georgia, with net inflows reaching 7.2 per cent in 2019, above levels seen elsewhere in the sub-region, for instance in the Russian Federation and Turkey. Three factors threaten its sustainability. First, as is evident from the 5-percentage point drop in 2018 (from 12 per cent in 2017), most current investment is market- and resource-seeking rather than efficiency-seeking, and thus easily affected by business cycles. An example of one of the most profitable resource-seeking investments made is the South Caucasus Pipeline Expansion Project implemented in 2014–2019. Second, weak support mechanisms, such as underdeveloped value chains and the lack of regulatory transparency, impede foreign investment. Third, access to financing is low and the costs are high, especially for long-term investment, and the banking sector is highly concentrated, further deepening the economy's microeconomic vulnerabilities (World Bank, 2018a).

Sectoral decomposition

A sectoral decomposition reveals that services and industry are strong whereas manufacturing and agriculture are in decline. Services accounted for about 60 per cent of GDP in 2019, but most industries have low productivity and cater largely to domestic demand. The large tourism and hospitality industries operate below potential. Manufacturing remains predominantly resource-based (57.7 per cent), with only modest shares of low- and high-tech production.

Demographics

One long-term impediment to economic growth is the dwindling population. With a constant zero rate of population growth and high net outmigration, the labour force continues to shrink (Geostat, 2019). As the pool of talent declines, economic dualism – large differences in productivity among sectors and regions – poses another threat to productivity-driven growth. Although the unemployment rate stood at 14.4 per cent in 2019 (a modelled estimate from the International Labour Organization), the urban-rural divide entrenches inequality and the large agriculture sector remains underdeveloped.

External position

Despite the sectoral risks, Georgia's strategic geographic position and economic openness will boost commerce, especially through the Deep and Comprehensive Free Trade Agreement (DCFTA) with the European Union (EU) and the more recent free trade agreement with China. The recovery of demand from key trading partners has lifted exports and strengthened workers' remittances (WTO, 2018). Services exports have skyrocketed in recent years. Merchandise exports have also grown, reaching levels significantly higher than those of Georgia's peers, with the sum of exports and imports constituting 121 per cent of GDP in 2018 – far above the regional average. Several impending megaprojects, such as the Anaklia Deep-Sea Port and Special Economic Zone (box I.1) and the Trans-Caspian International Transport Route, aim to further expand trade and solidify the country's position as a logistics hub, with alternative modes of cargo transport from Europe to China and Central Asia and a range of opportunities and spillover effects.

Despite the potential for diversification, Georgia's current export basket remains vulnerable to external fluctuations in commodity markets – and limited in terms of potential for capacity accumulation and diversification. The index of merchandise concentration for exports in Georgia was 0.21 in 2018, which indicates that, with values ranging from 0 (diversified) to 1 (concentrated), the country's exports in merchandise were only the fourth most diversified in the EESC sub-region, after Belarus (0.18), the Republic of Moldova (0.19) and Ukraine (0.14) (UNCTADstat, 2020a). Most of Georgia's exports are of low-margin commodities as the country is a leading exporter of ores and metals – products for which its revealed comparative advantage (RCA)² is strongest –

followed by beverages, animal stock and fertilizers (OEC, 2020; UNCTAD, 2020b). Nonetheless, to ensure sustainable diversification of exports and mitigate the country's vulnerability to external competition, Georgia can capitalize on its potential for diversification by experimenting more systematically with opportunities that increase both the sophistication and the diversification of tradables.

The 2020 Competitive Industrial Performance (CIP) Index shows that industry in Georgia (ranked 96th out of 152 economies) outperforms that in neighbouring Armenia (103rd) and Azerbaijan (120th) (UNIDO, 2020). The 2019 Global Competitiveness Index (GCI) ranked Georgia 74th among 141 economies, a decline from the previous year (66th), and identified as strengths its labour market (37th), institutions (43rd), human capital skills (46th) and business dynamism (58th) (WEF, 2019).

Box I.1

Anaklia Deep-Water Black Sea Port

Strategically located as a key transit port on the trade route connecting Europe with China (as a part of the Belt and Road Initiative), the Anaklia Deep-Water Black Sea Port is Georgia's largest infrastructure project. A range of plans are in the works for adjacent industrial zones. Although construction was due to finish in 2019, it has been postponed to June 2022 by the Ministry of Infrastructure, because of the lack of investment raised by the Anaklia Development Consortium. Given the potential for this project to secure sustainable revenues and, more importantly, to enable and channel growth, investment, diversification, trade integration and employment, finishing the construction of the port is imperative.

Sources: Zemke, Leszek Tymoteusz, 2016-30 Georgia, Anaklia New Deep-Water Black Sea Port, Eastern Partnership Transport Panel – World Bank, 8 November 2017; Agenda.ge, Georgian gov't to discuss future of Anaklia Deep Sea Port, 3 January 2020.

Institutional quality

The sorely needed investment into new ideas requires efficient institutions. Taking the average of the World Governance Indicators on rule of law, control of corruption, government effectiveness, and voice and accountability as a proxy for institutional quality (IMF, 2018; Kaufmann and Kraay, 2020), Georgia has a score of 0.5. Although this is higher than the scores of other EESC countries, it nonetheless suggests room for improvements to further strengthen institutional capacity.

Sustainable development

Over the past decade, the degree of poverty in Georgia has declined significantly, with the headcount ratio at the national poverty line dropping from 37.3 per cent in 2010 to 20.1 per cent in 2018. Yet the rate of poverty reduction has slowed, and many people depend on social benefits and pensions (IMF, 2018). A recently adopted pension reform (2018) aims to tackle this issue by increasing the distribution of social pensions and introducing a contributory private pension model.

To exploit opportunities for more growth, it is crucial that the economy make use of the full capability of its labour force, both men and women. The labour force participation rate of men is nearly 20 percentage points higher than that of women despite higher enrolment rates in tertiary education for women (68 per cent gross, compared with 60 per cent gross for men, in 2019), reflecting a source of underused human capital.

Before the economy can prosper further, the Government must also address several growing environmental challenges. According to the 2019 GII, the country ranks 86th out of 129 economies in GDP per unit of energy use. Mortality due to outdoor and indoor air pollution in Georgia, especially in Tbilisi, is very high relative to the sub-regional average. The pollution effect is compounded by resource management malpractices such as illegal logging, unmanaged forest fires and grazing of cattle in protected areas. Reorienting the economy to an environmentally sustainable direction will require substantial innovation.

Synthesis

This table presents the main achievements of and challenges for the economic development of Georgia, based on the findings described in this chapter.

Progress made so far

- A series of market-oriented reforms, improving the business climate, infrastructure and public administration
- Greater economic openness and a larger volume of international trade
- Lowered levels of corruption and improved quality of institutions
- Reduced poverty rates and rising incomes, achieving upper-middle-income status

Challenges ahead

- Address the constrained fiscal space, which is compounded by high public spending and broad tax exemptions.
- Diversify the export portfolio and increase high-tech production to build resilience and enhance competitiveness.
- Optimize untapped potential at the sectoral level to boost productivity and sustainable growth.
- Strengthen the role of innovation as a driver of productivity growth while maintaining the strong momentum of the reform process.

Source: UNECE.

Notes

¹ World Bank, In Georgia, growth projected to slow due to impacts of COVID-19, 8 April 2020.

² The revealed comparative advantage (RCA) database, created by UNCTADstat, measures trade patterns between countries based on their relative productivity. It does not take into account national trade measures, such as subsidies and (non-)tariff regulations.

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Website

Anaklia Development Consortium: <http://anakliadevelopment.com/info>

Chapter II

INNOVATION PERFORMANCE OVERVIEW

Innovation climate

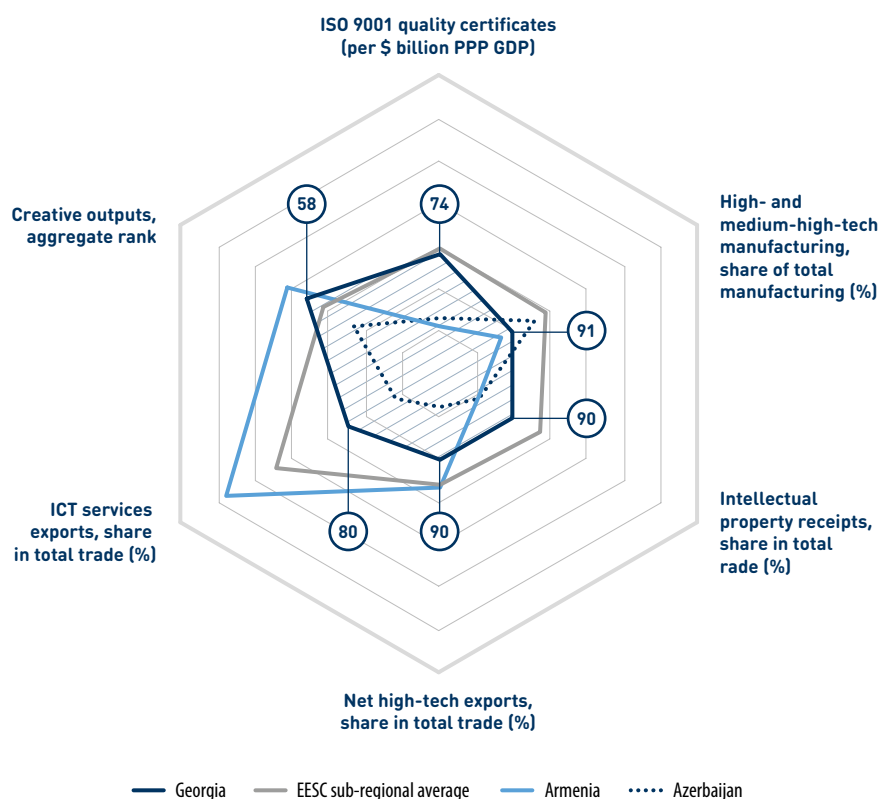
Although the reforms made over the past two decades have sustained growth, created jobs and increased investment, the economy still relies heavily on low value added exploitation of resources. Intermediate goods account for just 25.4 per cent of products (WITS, 2019). Commodity-dependent, Georgia is thus vulnerable to volatile export prices, making high value added production and a well-diversified export portfolio a priority for the country's economic development. Diversifying the economy – creating new economic activities and strengthening existing ones – is therefore essential for long-term sustainable development. Diversification requires broad experimentation with new ideas and innovation. This is a major challenge, given the weak education system, skills mismatches in the labour market, limited firm capabilities, low public funding of research and development (R&D), and scarce industry-science linkages. Innovation inputs not only are insufficient but often do not translate into outputs at an efficient rate, suggesting room for improvement in innovation policy support. With the right mix of that support, Georgia's favourable business environment, institutional and governance reforms, openness to trade and investment, good integration into international science networks and vibrant start-up scene form a solid basis for innovation-driven diversification and sustainable economic growth.

Innovation outcomes

According to the 2019 Global Innovation Index (GII), Georgia is an innovation achiever: it ranks 48th out of 129 economies worldwide, second behind Ukraine across the sub-region (Cornell University, INSEAD and WIPO, 2019). Its global position largely reflects the market-oriented and institutional reforms undertaken in recent years, as the economy still faces difficulties in generating innovation outputs. Figure II.1 depicts the economy's innovation performance on selected output indicators, as ranked in the 2019 GI.

The economy performs relatively well on the creative outputs dimension (ranking 58th), revealing strengths relative to its income group in industrial design by origin (11.8 per \$1 billion PPP GDP), as well as on creative service exports (0.5 per cent of total trade) and online creative outputs (ranking 53rd). At the level of firms, however, non-technological innovation needs improvement, as indicated by low ranks for Information and communication technology (ICT) and business model creation (97th) and for organizational model creation (99th). Firms have struggled to generate much technological innovation, particularly innovations that are internationally competitive.

Figure II.1 · Innovation performance by selected GII indicators, 2019 ranks



Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).

Note: Lower values indicate stronger performance.

Georgia ranks 90th or more globally on key innovation performance metrics, including these four: (1) the share of high-tech and medium-high-tech manufacturing in total manufacturing output; (2) the share of high-tech exports (0.3 per cent of total trade), which is higher than the share of Azerbaijan (0.1 per cent) but below that of other EESC countries (Cornell University, INSEAD and WIPO, 2019); (3) the share of creative goods exports in total trade volume; and (4) the volume of intellectual property receipts (revenues from selling or licensing Georgian intellectual property abroad). Recently the number of quality certificates from the International Standards Organization (ISO) has declined, dropping Georgia from a rank of 69th in 2018 to a rank of 74th in 2019, signifying lower levels of technology upgrading within the economy. These gaps are also due in part to weaknesses in the national innovation system and the supporting policy environment (chapters III and IV).

This general picture is confirmed by the latest Business Environment and Enterprise Performance Survey (BEEPS V) of the European Bank for Reconstruction and Development (EBRD) (2017), according to which only 16 per cent of the annual sales of small and medium enterprises (SMEs) in Georgia were accounted for by new or significantly improved products or services. The National Statistics Office of Georgia (Geostat)

surveyed firms on their innovation activity in 2016–2018, qualifying levels of market and production innovations across a wide range of indicators. It found that in 2017 about 14 per cent of Georgian firms had introduced or upgraded goods and services on the domestic market (Geostat, 2020).

The ICT sector has the largest high-tech share of the domestic market, at nearly 90 per cent of all technology output in the country. Mobile services dominate, giving rise to opportunities to incorporate innovative technologies. ICT usage and access have remained stable in recent years; about 21 per cent of the population had broadband subscriptions in 2018. This indicates the potential to develop new products and services both for use within the ICT sector and for the rest of the economy to use ICT more efficiently.

Innovation activity – channels, strengths and weaknesses

As a middle-income economy, Georgia can gain from developing innovations that are new at the global level. In addition, importing knowledge and technology from abroad, adopting it and adapting it to the needs of Georgian markets and firms can generate substantial progress in terms of growth in productivity and GDP, as well as economic diversification and sustainable development, while avoiding many of the costs and risks of frontier innovation. Several indicators suggest that Georgian businesses are actively using the main conduits for importing and adapting knowledge and technology.

International knowledge transfer

Georgia is one of the more open economies in the sub-region in terms of both trade and capital flows – the country is ranked 78th on knowledge absorption in the 2019 GII (Cornell University, INSEAD and WIPO, 2019). In 2019, inward FDI stood at 11 per cent of GDP, high-tech imports made up 7.5 per cent of total trade and almost 15 per cent of gross expenditure on R&D was financed from abroad. This means that Georgia is outperforming neighbouring Armenia and Azerbaijan on all three indicators (World Bank, 2020). In addition, Georgia is a net importer of intellectual property rights (IPRs), with the gap between payments and receipts exceeding \$27 million in 2018 (WIPO, 2019).

The 2019 Global Competitiveness Index (GCI), benchmarked against 141 economies, identified the country's institutions, within the subdimension of the enabling environment, and business dynamism, within the subdimension of the innovation ecosystem, as among its strengths (WEF, 2019). As a result of the improved business environment, the ease of establishing start-ups has also improved in recent years (Geostat, 2019). Yet, openness to knowledge inflows from abroad and a positive business environment are not enough. To successfully adopt and adapt knowledge and to build on it requires academic and business skills, and complementary R&D investment.

Investment in R&D

Strong spending on R&D, especially in the private sector, is an underlying factor for successful innovation. On a positive note, foreign funding of R&D plays a leading role

in Georgia, resulting in the country ranking 28th globally in the 2019 GII, well ahead of neighbouring Armenia (82nd) and Azerbaijan (100th). But overall, investment in R&D in Georgia is modest.

Gross expenditure on R&D reached only 0.3 per cent of GDP in 2019, despite recent improvements (UNESCO, 2019). Although higher than the shares in Armenia and Azerbaijan, this share remains below that in Belarus, where public spending on R&D amounts to 0.6 per cent of GDP. In addition, research universities in Georgia have financing available through tuition fees that equals the total state allocation to R&D. The number of researchers per million people (at 1.3) is higher than that of Turkey (1.2), but this reflects the fact that most R&D spending goes to salaries rather than projects.

Furthermore, government funding of R&D focuses almost entirely on research institutes at universities, with nearly 90 per cent of researchers in higher education and the other 10 per cent in other parts of the public sector. The concentration of R&D in the public sector is problematic because Georgian higher-education institutions (HEIs) have been much better at producing scientific publications than at effectively and systematically commercializing research outputs. Moreover, industry-science linkages remain weak. In the 2019 GII, Georgia ranked 98th among 129 countries on university-industry collaboration.

No researchers have been recorded as working in the private sector. Although Geostat does not yet publish official data on business expenditure on R&D, the total is thought to be very low. Preliminary data suggest estimations for in-house R&D of GEL 15.7 million and for extramural R&D of GEL 13.1 million. Expenditures on R&D contracted with other companies vary significantly across Georgian producers, with some reporting up to GEL 30,000 and others disclosing negative values.

Among the benchmarked countries in the Specific Background Report published by the EU (Armenia, Austria, Azerbaijan, Croatia, Georgia, Slovenia), Georgia has the highest share of international co-publications (69 per cent) with the most advanced subject areas – physics and astronomy, mathematics, and planetary sciences (EU, 2018), as well as the highest number of publications (1,970) and the largest share of citations (54 per cent). Furthermore, international co-publications account for 70 per cent of the total scientific output in Georgia. This high share indicates that the country is well integrated in the global research community and confirms the finding drawn from the GII scores that the research base is dependent on international funding and collaboration. This also reveals a kernel of excellence that could grow.

Skills development

Although government expenditure on education was 3.8 per cent of GDP in 2018, the quality of education is a concern. The Quacquarelli Symonds university ranking gives an average score of zero to Georgian universities, and in the Programme for International Student Assessment (PISA) the results for Georgia in reading, mathematics and science, and foreign languages are near the bottom of the rankings and below average for the region. The number of people enrolled in tertiary education in Georgia is greater than in Armenia and Azerbaijan, yet below the regional average. As a result, educational quality is a leading constraint to innovation in Georgia.

As a main obstacle to innovation in the private sector in Georgia, the EBRD (2017) identifies a lack of managerial skills, which causes low labour productivity and hinders the ability to experiment with and absorb new ideas, including in the State-owned enterprises that dominate certain sectors of the economy. This is also true in the ICT industry (EU4Business, 2017) as confirmed in the 2019 GII, in which Georgia ranked 70th on business sophistication, with only 10.5 per cent of firms offering formal training to employees. In response, Georgia's Innovation and Technology Agency (GITA) conducted an ICT skills needs assessment, identifying the skills and specializations most in demand on the local and global ICT markets and subsequently introducing policy support measures in the field (chapter IV).

Synthesis

This table presents the main achievements of and challenges to R&D and innovation (RDI) in Georgia, based on the findings described in this chapter.

Progress made so far

- Development of a business-friendly environment with adequate investor protection
- Significant improvement in institutional quality
- Good performance in attracting foreign investment and other forms of knowledge inflows
- Good integration in international academic networks, resulting in foreign funding and internationally relevant publications
- Introduction of an enterprise survey on national innovation activity
- Vibrant start-up scene

Challenges ahead

- Improve the commercialization of scientific results and establish systematic industry-science linkages.
- Increase the incentives for the private sector to invest in R&D.
- Enhance the quality of the education system, particularly in science, technology, engineering and mathematics (STEM).
- Reduce and mitigate the mismatch of skills between the labour force and the labour market.
- Promote higher levels of business sophistication, especially managerial practices, to allow for the absorption of new ideas.
- Increase innovation overall, both technological and non-technological.

Source: UNECE.

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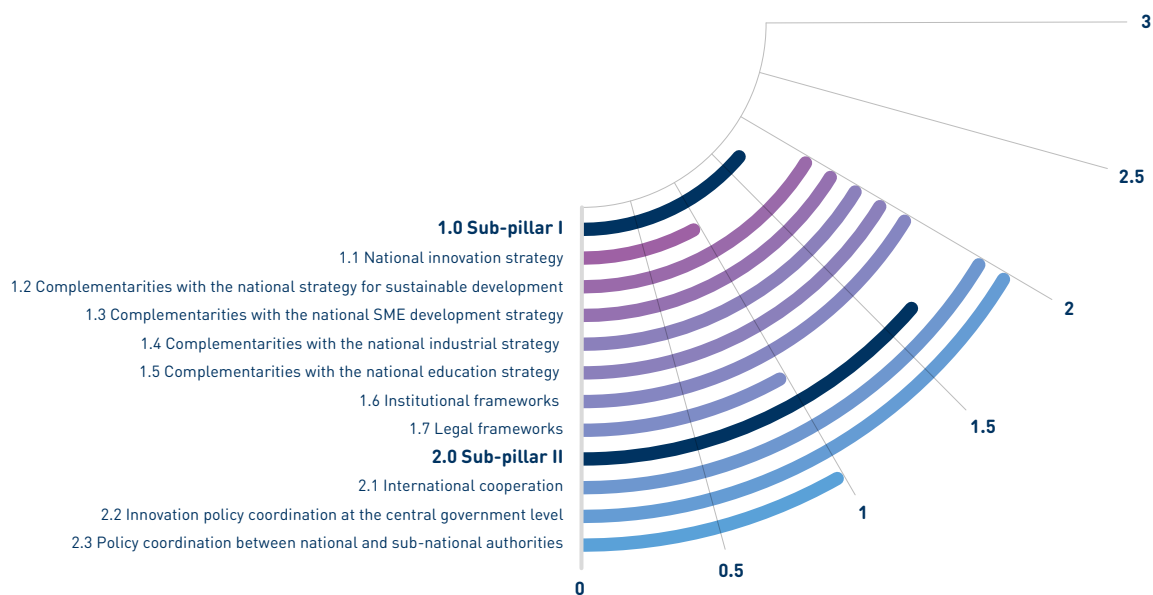
Chapter III

PILLAR I: INNOVATION POLICY GOVERNANCE

The first pillar of the IPO reviews the overarching strategic, institutional and legal framework for innovation policy, as well as the competences of and coordination among government bodies involved in innovation policy. This review assesses the extent to which innovation policy governance is sound, well-structured, efficient and flexible.

National innovation policy governance – strengths and weaknesses

Figure III.1 · Scoring of sub-pillars: innovation policy governance



Source: UNECE.

Note: Each indicator is assessed using a score from 3 to 0. The highest score (3) is given to fully fledged policy initiatives and mechanisms that can provide mutual learning opportunities for the EESC sub-region. A score of 2 is assigned if a policy initiative is operational. An indicator receives 1 point if a policy initiative is under development. The lowest score (0) is given if a country does not have a specific policy mechanism, strategic document or policy initiative. The indicators are based on an extensive questionnaire answered by national government agencies and external consultants. The questionnaire consists of open, binary and multiple-choice questions. Additional statistical data supplement the formal assessment framework by informing on key socioeconomic trends and context conditions. Statistical data are not directly integrated into the qualitative indicators but are used to guide scoring decisions. For more information, please refer to Methodology and Process.

Over the 10 years preceding the IPO, Georgia implemented a broad range of reforms aimed at increasing the efficiency of the public sector, supporting the deregulation of business, attracting investment and improving institutional frameworks. Innovation has been emerging as an important topic in the national policy agenda. The country's limited financial and human resources (chapter I) call for measures to enhance labour productivity and support RDI. Georgia has made tremendous progress in improving public governance. Recent reforms of government institutions and the establishment of new ones hold promise for motivating the development of RDI. Yet legal frameworks are not yet mature enough to support science and innovation effectively, and effective mechanisms for coordinating innovation policy within the central government and between national and subnational authorities are missing.

Table III.1 Overview of sub-pillars and indicators for innovation policy governance

Sub-pillar I: Innovation Policy Frameworks	Sub-pillar II: Innovation Policy Coordination
National innovation strategy	International cooperation
Complementarities with other policy areas	Innovation policy coordination within the central government and between national and subnational authorities
Institutional frameworks	
Legal frameworks	

Source: UNECE.

Sub-pillar I: Innovation policy frameworks

Given the many government levels involved in the design and implementation of innovation policy, it is vital to have a strategic document containing the Government's overarching vision.

National innovation strategy

The Georgian Government has made several attempts to adopt a national innovation strategy; however, none have been finalized, owing to changes of leadership in responsible institutions and changing policy priorities. At the time of writing, the Government was preparing a draft of a strategy to foster innovation activities, drawing on public-private consultations with business associations and with local and international experts, and on the expertise of government agencies. It was expected to adopt this strategy in 2020. The strategy addresses the need to focus research and industrial priorities on a limited set of objectives aligned to private sector needs and the objectives of the Horizon 2020 programme of the EU. The most recent draft seeks to

- Enable access to the research outputs of higher-education institutions (HEIs) and public research institutions through partnerships and public-private collaboration on research.

- Provide affordable financial products to fund innovation activities.
- Create an enabling environment for cross-sector research collaboration. Develop career pathways and promotion opportunities for researchers.

Potential policy interventions also may include measures aimed at supporting new market entrants, such as early-stage subsidies and tax exemptions.

The strategy calls for a strong yet agile central coordination mechanism, with membership from both public and private organizations, backed by a permanent secretariat. The action plan for the national innovation strategy defines the responsibilities of each government agency clearly, sets measurable performance metrics and establishes frameworks for transparent and regular reporting. The Government also plans to include performance metrics for agency procurement officers, to incentivize the procurement of new technologies.

Implementation of the strategy will require public and private organizations to collaborate closely. Historically that has been a challenge, given the large number of stakeholders and conflicting interests. A lack of coordination has led to duplicated activities and compromised implementation. The scarcity of qualified and empowered leadership in government institutions that have responsibilities for science and innovation also puts at risk the effectiveness of the strategy. The UNECE country missions to Georgia discovered that staff at public institutions lack the competences and skills they need to support the implementation of national science and innovation policy initiatives effectively.

Complementarities with other policy areas

The success of innovation policy and the achievement of the Sustainable Development Goals (SDGs) in Georgia highly depend on the ability of government agencies to align policy initiatives across the whole government and to foster coherence and complementarity in science, technology and innovation (STI) policy initiatives. In 2019, the Global Innovation Index (GII) placed Georgia in a group of 18 countries that outperform on innovation relative to their level of development (Cornell University, INSEAD and WIPO, 2019). That represents an improvement over the results in previous years and indicates the long-term commitment by the Government to supporting innovation-led economic growth.

Notwithstanding that commitment, unleashing the innovation potential of the economy faces a major obstacle: the lack of skilled professionals. According to the Organization for Economic Cooperation and Development's (OECD) Programme for International Student Assessment (PISA), students in Georgia demonstrate low proficiency in core skills (OECD, 2018a and 2019a). The national education system does not foster an entrepreneurial mindset and provides little training or lifelong learning opportunities. Soft skills such as a good command of foreign languages, leadership and creative thinking are not very well developed. In its present state, the national education system is not tailored to building talent for innovative R&D, and it provides only limited opportunities for entrepreneurial coaching and mentoring.

To overcome the knowledge gaps and the lack of skilled professionals, the State Commission on Education and Science Reforms designed the Education System Complex Reform 2018–2023, which addresses preschool, secondary, vocational and higher education. It recognizes the importance of lifelong entrepreneurial learning and outlines

dedicated mechanisms for strengthening an entrepreneurial culture, starting from preschool education. The Ministry of Education and Science (MoES) and the Ministry of Economy and Sustainable Development (MoESD) have recently launched a cooperative effort to align education policy with market needs, with the goal of reforming tertiary teaching and public research.

In 2019, the Government started implementing the Action Plan 2019–2020 for Lifelong Entrepreneurial Learning, which envisages the creation and improvement of an entrepreneurial education system. To strengthen entrepreneurial learning and foster innovation activities, the Government set up a network of innovative educational laboratories (called Fablabs) in vocational education and training institutions. All vocational education programmes include a mandatory module on entrepreneurship as one of the key competencies. In its current socioeconomic development strategy, Georgia 2020, the Government set out objectives to support long-term, inclusive and sustainable growth and to improve socioeconomic conditions for all citizens. It identified investment in STI as an important mechanism to improve productivity and enhance well-being. The socioeconomic development strategy thus emphasizes the needs to improve access to R&D funding, foster research commercialization, create innovation infrastructure and facilitate the use of ICT in the economy.

Innovation appears as a cross-cutting theme in other government strategies, including the Green Growth strategy under the MoESD and the National Renewable Energy Action Plan under the Ministry of Energy (OECD, 2018b). The MoESD is drafting the Green Growth 2030 strategy to spur sustainable development at the sector level, including improving resource efficiency in manufacturing and making better use of waste products.

Georgia has implemented several policies on R&D for the SDGs; examples include the Low-Emission Development Strategy and the National Energy Efficiency Action Plan. The Government will design initiatives to attract FDI oriented to the adoption of environmentally friendly and resource-saving technologies, to encourage the development of a green economy (EaP Green, 2018).

The SME Development Strategy 2016–2020, developed by the MoESD with the support of the OECD and the German Society for International Cooperation (GIZ), is based on the principles of the European Small Business Act and captures the best practices of the EU countries. The strategy has six objectives:

- 1.** Improve national legislative and institutional frameworks and the operational environment for SMEs.
- 2.** Improve access to finance.
- 3.** Develop skills and promote an entrepreneurial culture.
- 4.** Facilitate innovation and R&D among SMEs.
- 5.** Promote exports.
- 6.** Internationalize SMEs.

The Government seeks to improve access to funding for firms, especially for SMEs, by building the capacity of GITA. Some programmes, including Enterprise Georgia's small business financing programmes, have sought to address gaps by improving the affordability of debt financing, with some success. Nonetheless, government procurement standards,

processes and performance incentives hamper the adoption of innovative technologies and in some cases put the Government in direct competition with the private sector in high-tech industries.

Four authorities were initially put in charge of the programme, with Enterprise Georgia in the leading role. The others were GITA, the National Agency of State Property and the Agriculture Project Management Agency. In 2017, Enterprise Georgia became the sole coordinator of the programme. As of April 2020, the Government had distributed \$24.9 million in subsidies through the programme to 435 enterprises, which contributed to creating 15,770 jobs.

Institutional frameworks

Although Georgia has set up new government bodies responsible for enabling and promoting innovation and reformed existing ones, the design and implementation of policy still suffers from fragmentation, a lack of coordination and gaps in institutional capacity and training. This situation constrains implementation.

Four agencies – the Georgian National Academy of Sciences (GNAS), the Shota Rustaveli National Science Foundation of Georgia (SRNSFG), Enterprise Georgia and GITA – are the main entities shaping the development of the national science and innovation system. The GNAS has a long history of supporting RDI in Georgia; the other key institutions are still relatively new. With some minor exceptions, public organizations with responsibilities for science and innovation do not have effective coordination and communication channels. That leads to a fragmentation of efforts and hinders the effective implementation of science and innovation policy.

The GNAS provides services for monitoring, assessing and evaluating research activities performed by HEIs. It also offers policy advice to the Government on matters related to science, innovation and education. Its role has shrunk since Soviet times. Although the Academy is visible in education and scientific research, it lacks sufficient power and resources to drive positive change, not only in conducting research but also in ensuring research results are commercialized in the private sector. Reforms of the Academy have not been completely implemented yet: it still lacks the policy mandates and sufficient resources to make it a fully functioning institution. It is still forming relationships with other organizations.

The MoES established the SRNSFG in 2010, merging two former mechanisms for funding research. The SRNSFG administers targeted research programmes and projects, allocates research and travel grants, and supports research cooperation with international partners. The SRNSFG distributes GEL 32 million annually through research grants. Each year it administers 22 calls for proposals for grants for (a) basic and applied research, (b) basic research conducted by Georgians living abroad, (c) young researchers and (d) master's degree students.

The SRNSFG also serves as a think tank that provides analytical support for drafting policy related to science and innovation. Since 2014, it has implemented a series of organizational changes. In 2016 it introduced an international expert board and peer-review mechanisms to improve the quality of governance and increase the efficiency of allocation of research grants. To strengthen the evidence base, it recently launched digital tools for the administration of funded research, including the Unified Grants Management System and the Georgian Experts National System.

Another key player that supports SME development and encourages innovative performance in all companies is Enterprise Georgia. The agency offers co-financing mechanisms for SMEs for up to three years on loans with durations of up to 10 years, whether for creating new products and services or expanding businesses. So far, its largest shares of financial support have gone to the construction, food and beverage production and hospitality industries. Apart from that financial support, it offers programmes that render technical support. The agency helps Georgian companies participate in international fairs and trade missions to introduce products to targeted audiences, raise awareness, establish new contacts, strengthen cooperation and, most important, observe competitors' activities and capture market trends. It has also taken significant steps in terms of export education, consulting, marketing, online promotion of Georgian products and consultations, as well as in connecting multinational corporations with local companies and fostering linkages between domestic enterprises and foreign investors.

GITA is the key agency responsible for shaping and steering the national innovation system. Its services include elaborating the legal framework for innovation, skills training and capacity-building, and research commercialization, as well as strengthening linkages between academia and industry. GITA manages funding schemes provided by international development partners, including the EU and the World Bank.

Legal frameworks

To create an entrepreneurial, knowledge-based economy, Georgia has adopted new laws and amended existing ones. The Law on Innovations No. 5501-Ilc (2016) defines key concepts in R&D and innovation, as well as both the responsibilities and functions of innovation policy actors and the elements of the national innovation infrastructure. It was the first legislative act aimed at creating a national regulatory framework for innovation activities. Recent regulations enabled public HEIs and public research institutions to own shares in companies founded to commercialize research. Previously, only a few fragmented laws regulated technological development. From 2014 to 2016, the Order of the Minister of Economy and Sustainable Development defining the status, role and structure of GITA was the statutory act closest in intent to the Law on Innovations. Most related acts had been either entirely forgotten or ignored.

The procurement law of 2017 introduced the principle of equal opportunity for State bidding, thus enabling SMEs to participate more actively in developing innovative solutions. The Government is working on reorienting procurement standards and processes to encourage innovation. This work requires updating old standards to incentivize and create sufficient flexibility for innovative solutions, including better use of technology. The Government also needs to create incentives for procuring solutions that deliver the best outcomes, not just those that are risk-free. To help domestic firms develop and optimize the deployment of scarce technical talent, the Government should put in place institutional incentives to encourage outsourcing rather than a default to in-house production.

Policy initiatives and the regulatory environment are favourable for business activities. Areas for further improvement include IPRs and investment regulation. The Government has adopted a law on investment activity promotion and guarantees that regulates the State registration of foreign investment, introduces mechanisms for guaranteeing and

protecting investment, and outlines prohibitions and restrictions on investment activities. It also places investment activities under a favourable taxation regime. Venture capital investment in Georgia is regulated by the Law on Collective Investment Undertakings (2013). That law defines key activities and actors involved in collective investment, sets out the procedures for establishing such investment, and lays out the requirements and obligations of asset management companies. Georgia has harmonized its intellectual property legislation with the EU standards. The National Intellectual Property Centre (Sakpatenti) implements measures to raise awareness in the country about legal mechanisms for protecting and enforcing IPRs. Yet, IPR enforcement is not fully developed. The national system of IPRs also has room for improvement in transparency and accountability.

In cooperation with the GIZ and a cross-government working group, the Ministry of Justice developed a new Law on Insolvency Proceedings. In 2017, the Parliament adopted several amendments to it under Law No. 759. To further improve its enabling regulatory environment, Georgia should address outstanding policy gaps and build confidence in the country's institutional ability to enforce regulations efficiently and transparently. Regulatory frameworks require more detailed sub-legal acts, and government institutions that enforce regulation require capacity-building. In parallel, regular dialogue between the public and private sectors is critical for aligning the regulatory environment with the needs of business for innovation.

Sub-pillar I		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Levels of corruption are low. ✓ Georgia has made significant progress in improving the quality of governance. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Low levels of research funding make it challenging to nurture research excellence and fully participate in international cooperation in RDI. 	✓ Channel more resources towards the support of science and innovation in a manner that ensures the long-term sustainability of RDI activities.	Long-term	National government
	✓ Instil a competitive element into the science and innovation system.		
	✓ Align the increase in funding with carefully selected priorities for which strong research capabilities or economic potential exist.		
<ul style="list-style-type: none"> • The efficiency and effectiveness of public funding for R&D is insufficient. 	✓ Improve the capabilities of government institutions and grant recipients to manage financial and human resources efficiently.	Medium-term	National government
	✓ Ensure government authorities have the necessary skills, resources and capabilities to implement science and innovation policy initiatives.		
	✓ Improve monitoring, assessment and evaluation of government RDI activities by adopting the best practices of OECD member countries.		
	✓ Make implementation of these arrangements consistent.		

Sub-pillar I		IPO evaluation and recommendations (Concluded)	
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Supporting legal frameworks are not mature enough. 	<ul style="list-style-type: none"> Enhance and deepen legislative frameworks to create the necessary conditions for RDI activities, for example by strengthening mechanisms to protect IPRs and creating frameworks for venture capital investment. 	Medium-term	National government
<ul style="list-style-type: none"> Public procurement is not used to support innovation policy. 	<ul style="list-style-type: none"> Consider using public procurement as a policy instrument to support innovation. 	Medium-term	National government
	<ul style="list-style-type: none"> Create incentives for procurement of solutions that deliver the best outcomes, rather than just risk-free solutions. 		

Source: UNECE.

Sub-pillar II: Innovation policy coordination

Coordinated approaches help avoid overlapping, duplicating or omitting actions required to implement innovation policy successfully.

International cooperation

At the intersection of Europe and Asia, Georgia could play the role of a hub, providing connections for various economic entities. Low utility costs, a favourable business environment and the low level of corruption make Georgia an attractive destination for foreign investment. The Government allows citizens of 95 countries to work in Georgia without a visa for a year, a measure adopted to attract foreign professionals to the Georgian job market. After signing an association agreement with the EU in 2014, Georgia joined a preferential trade regime within the DCFTA. Not only did that grant access to the European market, it also stimulated reforms aimed at aligning Georgian trade policy with the regulations and standards of the EU. At the same time, the greater openness of trade puts Georgian enterprises under increasingly competitive pressure from European counterparts and calls for them to develop new, innovative products and services.

The long history of science in the country and universal access to education form a considerable potential for future knowledge-based growth. Georgian research organizations maintain cooperation linkages with leading international research centres, including the European Organization for Nuclear Research and the Joint Institute for Nuclear Research in Dubna. Several Georgian research organizations, such as the G. Eliava Institute of Bacteriophages, Microbiology and Virology and the national defence research centre, Delta, conduct world-class research and participate in global academic networks. Thanks to its favourable geographic location with 35 biodiversity zones, Georgia has unique conditions for developing biodiversity research and actively participating in international collaboration in this research field.

The Georgia 2020 socioeconomic strategy sets out a goal to remove legislative barriers so as to promote the international mobility of researchers and students. The EU Association Agreement provides Georgia with a wide range of initiatives targeted at ensuring the integration of Georgia into European academic networks, including grants for joint projects, exchange programmes for researchers, and adoption of standards and regulations. Drawing on the resources of the European Research Council Fellowship Programme, for example, the SRNSFG provides preparatory grant schemes for Georgian researchers to develop the capabilities and skills they need to compete internationally. In 2016, Georgia joined the EU's research and innovation framework, Horizon 2020, but Georgian researchers do not yet use the framework's opportunities effectively.

Innovation policy coordination within the central government and between national and subnational authorities

The Research and Innovation Council (RIC), founded in 2015, is a strategic coordination body that aligns STI policy initiatives across central and regional government agencies. The Council seeks to reduce inconsistencies in policymaking created by political cycles and the consequent short-term horizon of many policy decisions. The RIC is responsible for

- Coordinating the formulation of the national innovation strategy
- Coordinating the development of national and regional innovation initiatives
- Monitoring innovation policy

The Council consists of representatives from the public and private sectors, including academia. An Ordinance of the Georgian Government defines the Council's scope of activities and structure. Representatives of civil society, groups of experts, government authorities and other stakeholders can participate in the Council's work as invited guests. To date, however, the RIC has not generated significant impacts on STI policy in Georgia. Since its establishment, the Council has held only two meetings, which were dedicated to operational tasks rather than high-level policy issues. Some attempts have been made to establish effective channels of communication between the public research funders – Enterprise Georgia, GITA and the SRNSFG – but none have brought about decisive progress in advancing coordination and fostering synergies in funding schemes.

For Georgia, as a small country, strong collaboration between national and subnational authorities is less important than in bigger countries, yet national and regional authorities do not have effective coordination channels either. More important, Georgian regional and local government agencies play a very small role in science and innovation policy. The Georgia 2020 socioeconomic strategy has a regional component that spans various development areas, including innovation, and emphasizes the need for consistent decentralization and a leading role for subnational units. The lion's share of all research and innovation activities is concentrated in Tbilisi. The draft of the innovation development strategy includes the development of a digital talent-sourcing platform to help Georgian companies attract talent from regions that have strong ICT sectors to meet their workforce needs.

In 2018, the United Nations Development Programme (UNDP), working with the Ministry of Regional Development and Infrastructure of Georgia, launched a project called "Fostering Decentralisation and Good Governance at the Local Level in Georgia". The project aims

to promote the national decentralization reform and create good local governance. By strengthening the capacities and expertise of local government administrations, the decentralization reform will make possible greater efficiency and effectiveness in policy initiatives. By 2025, 7–8 per cent of GDP will be channelled to municipal budgets. That will enable municipalities to play a more prominent role in national policymaking, including in science and innovation.

Sub-pillar II		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Georgia has strong scientific and economic linkages with countries that lead in science and innovation. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Innovation policy initiatives are not fully aligned with each other, And mechanisms for coordinating innovation policy are lacking. 	<ul style="list-style-type: none"> ✓ Improve coordination mechanisms across central, regional and local government authorities. 	Short-term	National government
	<ul style="list-style-type: none"> ✓ Reinvigorate the RIC to ensure required levels of coordination take place within the central government. 		
	<ul style="list-style-type: none"> ✓ Establish joint working groups among ministries to coordinate innovation policy initiatives. 		
<ul style="list-style-type: none"> • Regional authorities lack the capabilities to support innovation policy. 	<ul style="list-style-type: none"> ✓ Strengthen the capabilities and skills of regional authorities to effectively formulate, implement, monitor and evaluate science and innovation policy initiatives. 	Long-term	Regional governments, with the participation of the national government

Source: UNECE.

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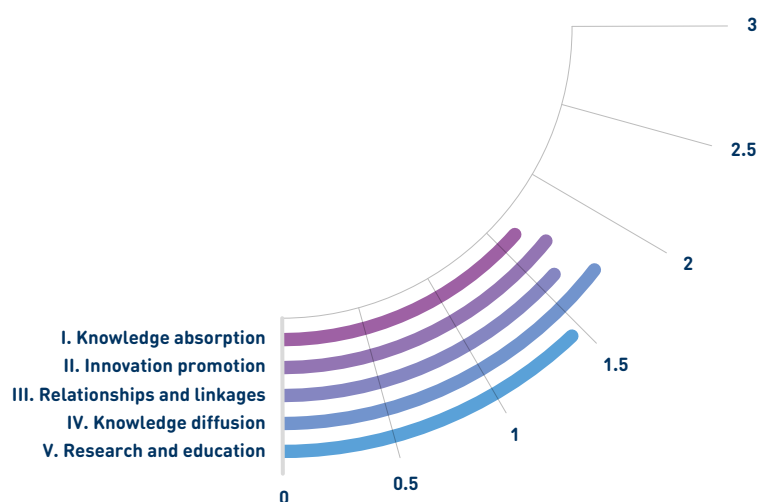
Chapter IV

PILLAR II: INNOVATION POLICY TOOLS

This chapter reviews the policy mechanisms in Georgia that enable, promote and diffuse innovation. It addresses five sub-pillars: knowledge absorption, innovation promotion, relationships and linkages, knowledge diffusion, and research and education.

National innovation policy mix – strengths and weaknesses

Figure IV.1 · Scoring of sub-pillars: innovation policy tools



Source: UNECE.

Note: The IPO pillar scoring is calculated on the basis of the average quantitative assessment of individual indicators under each sub-pillar. In the evaluation all support measures in a given area are taken into account and special consideration is paid to indirect contributions from external mechanisms. The overall band score for each sub-pillar forms the following generalized categories: 0.0–0.5, No policy instruments/mechanisms exist; 0.5–1.5, Policy efforts are in their initial stage of development; 1.5–2.5, Policy efforts are evident and partial implementation takes place; 2.5+, Policy efforts are comprehensive and monitoring activities are systematic. The scores for individual indicators are as follows: 0, No policy instrument/mechanism exists; 1, A policy measure/s is/are under development /has/have partial or indirect impact; 2, A policy scheme/s is/are operational and implementation has started; 3, Implementation is advanced and evaluation/impact assessment is taking place. Policy measures with sector-specific or partial or non-targeted impact on a given area are subject to case-by-case evaluation. For a more detailed discussion of the IPO scoring methodology, please refer to Methodology and Process.

In line with the Georgia 2020 socioeconomic development strategy, the Georgian Government structures innovation policy by taking into account the growing competitiveness of the private sector, the expanding start-up scene and the overall economic climate of the country (Georgia, 2014). Various support schemes for innovative activities, innovation spaces and business development services, as well as efforts made on cross-border research collaboration, have built a strong basis for the emerging innovation ecosystem. Challenges that remain include gaps in policy on organizational and managerial practices, industry-science linkages and support for investment in R&D. The IPO evaluation of policy tools found the strongest relative performance on the sub-pillars of *Knowledge diffusion* and *Innovation promotion*. It also identified room for improvement on the sub-pillars of *Relationships and linkages* and *Research and education* (figure IV.1).

Table IV.1 Overview of sub-pillars and indicators for innovation policy tools

Sub-pillar I: Knowledge Absorption	Sub-pillar II: Innovation Promotion	Sub-pillar III: Relationships and Linkages	Sub-pillar IV: Knowledge Diffusion	Sub-pillar V: Research and Education
Promotion of public and private sector organizational and managerial practices	Business plan and start-up competitions	Innovation voucher schemes	Information and brokerage schemes for technology upgrading	Policies to increase the number of science, technology, engineering and mathematics graduates
Schemes to support the development of technical and business services	R&D loans	Cooperative R&D grants	Standards, testing and certification instruments for SMEs	Policies to foster research development
Fiscal incentives for acquiring knowledge capital	VAT exemptions	Supplier matching services	Industrial technology assistance programmes and extension services for SMEs	
	Technology incubators	S&T parks	Public procurement for innovation	
		Innovation spaces	Digitalization	
		Technology accelerators		
		Business networks and clusters		
		Academia-industry linkages		
		Diaspora networks		
		Gender equality		

Source: UNECE.

Sub-pillar I: Knowledge absorption

The process of assimilating external knowledge plays a substantial role in developing dynamic core competencies, as well as in gaining competitive advantage and creating new value chains.

Promotion of public and private sector organizational and managerial practices

Promoting organizational and managerial practices is a challenge: Georgian businesses have not yet developed substantial managerial skills and better application of good practices is needed (chapter II). A policy measure for the promotion of private sector organizational and managerial practices is under development. In 2018, several State-funded projects were conducted to strengthen this capacity, including the Export Manager Certificate course organized by Enterprise Georgia under the Produce in Georgia initiative, and the Management Skills training led by the National Tourism Administration of Georgia. In addition, the International Chamber of Commerce Georgia cooperates with education institutions to promote and provide vocational training alongside events such as “How to Manage Enterprises Efficiently”, which it held in 2019. Reaching the efficiency frontiers of optimal performance and product innovation will require more State-funded investment in human capital, specifically through labour mobility and training.

Schemes to support development of technical and business services

Both GITA and Enterprise Georgia support the private sector with technical and business services for marketing and diversifying exports of goods and services, and plan greater popularization efforts after technical barriers are addressed (Georgia, 2015). According to the OECD’s SME Policy Index 2020, Georgia has significantly improved public support in this area in recent years, with a high share of local SMEs (about 50 per cent) having benefited from publicly funded or co-funded business development services in 2017 (OECD, 2020). The range of information technology (IT) training that GITA provides, which includes programming, coding languages and cybersecurity direction, further strengthens the potential of firms to innovate. In addition, the international product exhibitions supported by Enterprise Georgia increase trade flows and the visibility of export-oriented companies, promoting Georgian products and services in international markets.¹

Fiscal incentives for acquiring knowledge capital

Although several schemes provide financial support to Georgian enterprises, fiscal incentives specifically aimed at innovation are scarce, despite the significant overspending on tax relief in recent years (chapter I). The generous taxation framework includes an array of exemptions for businesses in addition to several free industrial zones. Firms that export IT services are eligible to apply for a Virtual Zone Person certificate granting them exemption from corporate income tax. What is more, entrepreneurs with small business status pay tax on only 1 per cent of their revenue, and some transactions that have an innovative component are exempt from value added tax (VAT), including financial

services, importation of materials and semi-finished goods intended for producing export goods, importation of machinery and means of transportation, and supplies of goods or services between enterprises in a free industrial zone (PWC, 2017).

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Several initiatives for developing the organizational and managerial capacities of SMEs have started in recent years, stimulating knowledge absorption through non-technological innovation. ✓ A large share of SMEs has benefited in recent years from publicly supported technical and business services, in response to higher business density and market demand. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Available policy tools do not sufficiently promote public and private sector organizational and managerial practices, thereby fuelling low productivity and inefficient working processes. 	<ul style="list-style-type: none"> ✓ Initiate regular capacity-building activities for public and private sector employees based on best practices, specifically workshops and courses in management and leadership. 	Medium-term	Enterprise Georgia Georgian Institute of Public Affairs
	<ul style="list-style-type: none"> ✓ Expand support for local entrepreneurs and SMEs in the form of training in innovation management and technology. 		
	<ul style="list-style-type: none"> ✓ Organize an annual competition for best organizational and managerial practices in Georgia, to encourage development and competitiveness in this area. 	Short-term	Enterprise Georgia Georgian Chamber of Commerce and Industry
<ul style="list-style-type: none"> • Schemes aimed at expanding technical and business services have not yet developed fully to unlock innovation in the production processes of firms. 	<ul style="list-style-type: none"> ✓ Develop support programmes further, aiming to equip firms with practical knowledge and expertise (for example, brainstorming sessions, vocational training, informational sessions on new IT systems, and technical and business services). 	Medium-term	Enterprise Georgia
	<ul style="list-style-type: none"> ✓ Expand IT training to target not only individuals but also business teams, increasing the capacity and productivity of SMEs. 	Short-term	GITA
<ul style="list-style-type: none"> • Fiscal incentives for innovation have not yet been applied despite the broad system of tax exemption. 	<ul style="list-style-type: none"> ✓ Adopt a tax credit system applicable to eligible costs generated by R&D investment, including wages, production inputs and assets. 	Short-term	GITA

Source: UNECE.

Sub-pillar II: Innovation promotion

Promoting innovation requires governments to invest in establishing platforms where young companies can develop and test innovative ideas.

Business plan and start-up competitions

Business plan competitions take place in the framework of micro and small entrepreneurship promotion programmes directed towards boosting entrepreneurial spirit in the country, such as Enterprise Georgia’s Small Grants Scheme, which funded 6,212 projects in 2015–2018 (Enterprise Georgia, 2019). GITA has funded 76 start-ups under the Start-up Matching Grants Programme that it launched in 2018 and 9 companies under the Innovation Matching Grants programme that it launched in 2019, while uniting 200 start-ups in its network. Its regional Start-up Boot Camps involve neighbouring countries in common projects centred on developing an innovation ecosystem in the region. In 2017, the Ministry of Education, Science, Culture and Sport (MESCS) and GITA organized a vocational education hackathon during which students created prototypes of their innovative and high-tech ideas, competing for funding to create their own start-up companies.³ Although many firms have received funds under these projects, no impact assessment has yet measured the effect of those funds on the productivity and growth of the beneficiaries. Synergies between the various grant schemes should be explored.

Support for RDI investment

Firms in Georgia regard access to finance as a major business environment constraint, according to EBRD enterprise surveys, BEEPS IV and V (EBRD, 2017). A major challenge for firms is their poor access to early-stage finance for innovative activities, which is mainly caused by strict risk assessment practices. In 2019 the MoESD launched a programme to provide state guarantees to help private sector representatives overcome the loan guarantee barrier.³ In addition, several grant schemes support business development with funds allocated by the state and international donors (table IV.2). For example, GITA implements the Innovation Matching-Grants Programme as part of the World Bank’s Georgia National Innovation Ecosystem (GENIE) project. These grants vary between GEL 150,000 and GEL 650,000 (for an examination of the policy process of this project, see chapter V).⁴

Table IV.2 Main grant schemes

Grant scheme	Implementing body	Programme objective	Funds allocated	Year introduced
Small Grants Programme	GITA	Promote start-up creation and development	GEL 426,930	2016
Start-up Matching Grants	GITA	Support the growing start-up movement in Georgia	GEL 2 million (per call)	2018

Table IV.2 Main grant schemes (Concluded)

Grant scheme	Implementing body	Programme objective	Funds allocated	Year introduced
Innovation Matching Grants	GITA	Stimulate innovation and creation of innovative enterprises	GEL 150,000–650,000 (per grant)	2019
Produce for Better Future	Enterprise Georgia	Support business development in the Abkhazia or Tskhinvali regions	GEL 35,000 (per grant)	2019
Applied Research State Grants	SRNSFG	Foster research within a competitive environment	GEL 420,000 (per consortium)	2011
Basic Research State Grants	SRNSFG	Promote the development of excellent research in compliance with international standards	GEL 40,000 (per grant)	2011
Research Grants for Young Scientists	SRNSFG	Attract young researchers and develop their scientific potential.	GEL 15,000 (per grant)	2015

Source: UNECE.

According to the European Commission’s (EC) background report on policy support to research and innovation in Georgia as part of the EU Horizon 2020 programme, about half of the State’s R&D funding (GEL 32 million in 2016) is institutional, whereas the other half is competitively awarded by the SRNSFG, mainly through State science grants for applied research and support programmes to individual researchers (EU, 2017). However, the State does not provide specific subsidies or loans to offset costs arising from the innovation process or make VAT exemptions available to stimulate the production of innovative goods. Instead, separate support elements are in place. For example, Enterprise Georgia provides incentives under the Produce in Georgia initiative through a credit guarantee mechanism. The scheme aims to improve access to finance for SMEs and to facilitate lending by ensuring partial collateral guarantees for the first three to four years of operation, for up to 50 per cent of the loan (Enterprise Georgia, 2019).

Technology incubators and accelerators

The technology incubator and accelerator scene in Georgia is steadily transitioning from focusing on general business development to targeting innovation. GITA introduces such targets in its operations to increase the productivity of the inventors and start-up companies to which it provides access to finance, knowledge and infrastructure. Its Business Incubator project targets young entrepreneurs; following five months of intensive training, they present their ideas to investors on a “demo day” (GITA, 2019). Several universities also have established business incubators on their premises, including the Free University, Georgian Technical University, Iliia State University, Business and Technology University, Tbilisi State University and the Tbilisi State Academy of Arts. In addition, three private accelerators operate in Georgia – the SPARK accelerator (funded by the EU and Tbilisi City Hall), TBC Startuper and BOG Fintech. The Start-up Factory of the University of Georgia provides acceleration services and co-working space, connecting start-up teams with investors and international markets. Incubation services that support the development of start-ups through, for example, business and skill training and technological assistance,

are also increasingly provided in incubators and accelerators. Several structures are being developed under the GENIE project (see chapter V), including a network of regional innovation hubs and community innovation centres.

Sub-pillar II IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Business plan and start-up competitions have been introduced in recent years, offering support to enterprises at early stages of their development, building a network of start-ups and SMEs. ✓ Multiple grant schemes are applied to stimulate investment in research and innovation, including start-up matching grants, schemes for scientists and support for business development. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy support for innovative project development does not sufficiently address the issue of low access to finance, failing to cover costs arising at different stages of the innovation process. 	<ul style="list-style-type: none"> ✓ Develop public R&D funding programmes for organizations and firms engaging in R&D activities using direct financial instruments (such as subsidies, credit guarantees, semi-public equity instruments). 	Medium-term	GITA Enterprise Georgia
	<ul style="list-style-type: none"> ✓ Create a targeted support tool to develop the venture capital industry and business angel funding, to expand the activities of relevant associations and networks operating in the domestic market. 		
	<ul style="list-style-type: none"> ✓ Introduce tax incentives for foreign venture capital investors (such as risk capital guarantees). 		
	<ul style="list-style-type: none"> ✓ Consider establishing a publicly supported venture finance institution that is based on international experience and best practices in the field. 		
<ul style="list-style-type: none"> • The impacts of business plan and start-up competitions are not regularly assessed, leading to potential inefficiencies in the use of public resources. 	<ul style="list-style-type: none"> ✓ Develop an assessment framework for business plan and start-up competitions to standardize the post-evaluation process and identify effective practices. 	Short-term	Enterprise Georgia
	<ul style="list-style-type: none"> ✓ Expand the mix of business plan and start-up competitions to include recognition instruments (such as industry-specific awards for best innovative products and services). 		
<ul style="list-style-type: none"> • Fiscal incentives for innovation have not yet been applied, despite the broad system of tax exemption. 	<ul style="list-style-type: none"> ✓ Promote innovation by reorienting the overly broad tax exemption system through schemes involving VAT relief on sales of high-tech or innovative goods and services, as well as various tax cuts related to R&D investment (such as income tax exemption on investment dividends, to target business angels operating in the domestic market). 	Short-term	MoESD Ministry of Finance GITA

Source: UNECE.

Sub-pillar III: Relationships and linkages

Schemes that promote linkages between science and industries help create innovative ecosystems by assisting scientists and businesspeople in commercializing research, creating products and developing new organizational processes.

Business networks and clusters

Enterprise Georgia and GITA promote membership in business associations and networks by raising awareness through the platforms of the Enterprise Europe Network (EEN) and Trade with Georgia, offering SMEs advice, support and opportunities for international partnerships (EEN, 2019). Both Enterprise Georgia and GITA are members of the EEN Georgia Consortium, which also organizes forums and meetings. Enterprise Georgia provides business matching services to export-oriented companies, supporting their efforts to find partners by organizing international exhibitions and business-to-business (B2B) events, such as the “Invest in Georgia” B2B Forum in 2016, which focused on accessing finance, obtaining technical assistance, promoting exports and internationalizing business. Given the limited capacities and resources of SMEs, providing these services online and offline can accelerate innovation, benefiting both buyers and suppliers.

Clusters are an efficient tool for fostering productivity and competitiveness among SMEs, enabling greater transfer of technology and the attraction of foreign investment. In 2018 the MoESD announced a strategy of creating clusters to stimulate technology transfer, networking and information diffusion among SMEs. Several clusters registered in Georgia are now affiliated with the European Cluster Collaboration Platform, including Georgia Medical (Tuberculosis) R&D, Georgian Furniture, Georgian Film and the Georgian Tourism Association. Another cluster – Georgian ICT – was established in 2018 under an EU-funded SME development project and the DCFTA project implemented by GIZ. In addition, the EU Innovative Action for Private Sector Competitiveness in Georgia established two more clusters – Seeding and Packaging – in 2020. This joint initiative of the EU and four United Nations agencies – the UNDP, the Food and Agriculture Organization, the United Nations Industrial Development Organization (UNIDO) and the International Organization for Migration – is focusing on identifying eight more potential clusters, as well as building the capacity of institutions that provide support tools to clusters.

Innovation support infrastructure

One of GITA’s main projects is the Techno Park, which has supported the development of technological entrepreneurship in Georgia since 2016 by engaging innovative individuals through the so-called “single window” principle in a co-working space. The park provides state-of-the-art facilities and programmes (chapter V) with the purpose of developing a technology and innovation ecosystem combining incubators, training centres and laboratories as well as office, shared work and recreational spaces. GITA has also established two regional innovation hubs and five innovation centres, all using a similar approach (GITA, 2019). Among GITA’s projects to develop innovation infrastructure

are the FabLabs and iLabs, a network of industrial innovation laboratories that target start-ups. As of 2019, 22 manufacturing innovation laboratories offer advanced machinery and devices in work areas such as product prototyping, architectural design and open-source development of machinery and technology (Georgia, MoESD, 2019).

Academia-industry collaboration and mobility

Business research networks in Georgia are still in the initial stage of development. In 2019 GITA launched a pilot technology transfer programme to help commercialize scientific results that respond effectively to market needs. Under the programme, 74 applicants have submitted projects to receive support for commercialization, revealing high potential for the future development of this policy measure. In addition, a few activities are taking place in the direction of mobility between academia and businesses (chapter II). Examples are the internships abroad funded by the SRNSFG under the Young Scientists' Development Scheme and the EC-funded project "Supporting Inter-sectoral Collaboration Possibilities between Research and Industry", being implemented during 2018–2021.

In addition, several entities are developing an innovation voucher scheme to foster collaboration, drawing on EU-OECD models. Vouchers worth, for example, GEL 4,000–5,000 will be granted for prototyping or researching. Initially they will go to B2B joint research projects; vouchers for business-to-university and research centre collaborations are scheduled for 2021–2022. GITA will carry out the scheme in partnership with the MESCS, Enterprise Georgia, the SRNSFG and the GNAS.

Diaspora networks

The SRNSFG is involved with collaborative research projects with compatriots overseas. Its competition-based grants aim to intensify the process of involving successful Georgian scientists who are working abroad in joint activities with scientists working at home, in order to improve standards of research in Georgia. In addition, the Georgian diaspora plays a significant role in local start-up development: in 2019, their private investments amounted to GEL 1.2 million.

Gender equality

Better use of women's skills is critical for the development of innovation in Georgia, given the growing share of women among tertiary degree graduates, professionals and technicians. In fact, women with advanced education now consistently outnumber men with such education. Women's tertiary school enrolment rate was 68.1 per cent in 2019, yet the labour-force participation rate of men is nearly 20 percentage points higher than that of women, reflecting an underlying gender gap (World Bank, 2020). In 2017, a governmental decree established a multiparty commission on gender equality, violence and domestic violence against women. It has three thematic working groups, including the Working Group on Women's Political Participation, with member representatives of governmental, non-governmental and international organizations (Georgia, Gender Equality Council and others, 2018).

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ In response to greater business density in recent years, business networks have received greater policy support in the form of B2B events, international platforms and matching services.
- ✓ The Techno Park fosters early-stage development of start-ups and innovative projects, applying a “single window” principle in a co-working space that comprises incubators, training centres and laboratories.
- ✓ Innovation infrastructure has developed further with the establishment of a network of industrial innovation laboratories targeting start-ups – iLabs and FabLabs – and supporting product prototyping and technology development.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy support aimed at strengthening industry-science linkages is insufficient. 	<ul style="list-style-type: none"> ✓ Expand the policy mix, stimulating science-based innovation projects carried out by Georgian SMEs in collaboration with public sector research institutions (such as cooperative R&D grants, innovation voucher schemes, competitive calls for innovation and technology upgrading) and dedicate public funds for networking events (such as hackathons, road shows, high-tech days). 	Medium-term	GITA SRNSFG
<ul style="list-style-type: none"> • The lack of industry research networks makes for weak collaboration between research institutions and business enterprises. 	<ul style="list-style-type: none"> ✓ Develop a formal framework for developing innovation clusters based on strengthened science-business linkages in industries of national competitive advantage. ✓ Provide academia-industry matching services where researchers with highly innovative projects are linked with potential partners. ✓ Develop the technology transfer system further, to strengthen linkages between knowledge-based institutions and enterprises in the domestic market. ✓ Identify pilot collaborative projects in priority areas to receive coordinated public support and raise awareness among Georgian businesses and researchers. ✓ Increase interest in science-industry collaboration using success stories to illustrate the mutual benefits and potential to commercialize joint projects. ✓ Develop a monitoring framework for HEIs and public research institutions to consolidate and regularly update publicly available data on research studies, to align scientific activity with private sector need and commercialize more research. 	Medium-term	GITA MoESD
<ul style="list-style-type: none"> • Low science-industry mobility and poor researcher evaluation impede the creation of synergies between fundamental and practical knowledge. 	<ul style="list-style-type: none"> ✓ Implement research-industry support schemes that include funding for work placements for young researchers in the domestic market (such as repayable state grants, fellowship stipends and staff exchange initiatives). ✓ Develop a researcher evaluation framework, including at HEIs and public research institutions, that is based on teaching and scientific activity, and collaborative work with the private sector and integrate it into established institutional processes (such as hiring, promotion and tenure). ✓ Introduce performance-based incentives for joint academia-industry projects and research commercialization. 	Short-term	MESCS

Sub-pillar III IPO evaluation and recommendations (Concluded)

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Few policy measures are in place to target diaspora networks, bypassing a potential source for knowledge exchange. 	<ul style="list-style-type: none"> ✓ Develop a national programme targeting the Georgian diaspora which includes political, economic and social provisions tailored to nationals abroad, for the purpose of building a community network and transferring knowledge and technology. 	Medium-term	Ministry of Foreign Affairs
<ul style="list-style-type: none"> There is a lack of measures for gender equality necessary to maximize the workforce potential given the shrinking population. 	<ul style="list-style-type: none"> ✓ Conduct gender-based analysis and report gender-disaggregated statistics, to understand the dynamics and implications of any planned action with respect to gender equality, to identify potential areas of intervention and to introduce gender-driven policies and programmes. 	Short-term	All ministries
	<ul style="list-style-type: none"> ✓ Expand the policy support mix available to female entrepreneurs, helping them to identify local development niches and build professional qualifications in areas where they are underrepresented. 		Enterprise Georgia MoESD

Source: UNECE.

Sub-pillar IV: Knowledge diffusion

Mechanisms that ensure equal and widespread access to information are vital to creating an innovative ecosystem in both the public and the private sector, serving as channels for the distribution and intersectoral flow of information.

Standards, testing and certification

Although Georgia has no specific instruments for standards, testing and certification of SMEs, the procedures for issuing licences and permits have been significantly simplified since two principles – the “one-stop shop” and “silence is consent” – were introduced to speed up the process. Since 2005, strong reforms have led to a nearly 90 per cent reduction in the number of licences and permits required. Currently, licences and permits are required only for producing highly risky goods and services, for using natural resources and for some other specific activities.

Digitalization and e-governance

Digitalization can accelerate economic growth and improve social well-being in Georgia by offering opportunities to reconfigure how businesses and economies operate. GITA’s innovation infrastructure project includes the implementation of an internet development programme for 1,500 socially unprotected families living in high mountainous areas and 1,500 regional SMEs. The programme consists of training, broadband connection portals and online vouchers.

Openness and transparency of data are among the priorities of the Government, as reflected in the Open Government Partnership 2014–2015 Action Plan. The Data Exchange Agency, developed under the Ministry of Justice in 2010, is an e-governance development agency that has created a national open database and led projects in cybersecurity and data exchange infrastructure⁵ (Georgia, 2019). In addition, the public finance management system is entirely accessible to the public through several online systems, including e-budget, e-treasury, e-procurement and e-auction systems (Krabina and others, 2014).

Other policy tools

The policy tools in use in Georgia do not sufficiently address gaps in knowledge diffusion with regard to leveraging the potential of public procurement for innovation, brokerage schemes for technology upgrading and industrial technology assistance – although several efforts have been made in the last two areas. Brokerage schemes for upgrading technology include the state programme Produce in Georgia implemented by Enterprise Georgia, which supports entrepreneurs by providing financial and technical tools and mechanisms,⁶ and the preliminary patentability assessment mechanisms offered by Sakpatenti, the national intellectual property centre of Georgia. It provides, for example, free distance learning courses on IPRs.⁷

Industrial technology assistance includes the efforts of the SRNSFG in administering grant calls for applied research as part of the GENIE project, with the aim of fostering the implementation and commercialization of innovations.⁸

Sub-pillar IV IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Evident progress has been made in aligning the national quality measures with international standards and best practices, and the procedure for issuing licences and permits has been significantly simplified. ✓ The development of digitalization has led to higher connectivity both nationally and across disadvantaged groups, while the transition to e-government is increasing openness and transparency. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Information and brokerage schemes are lacking for the technology upgrading that is essential for planning and implementing innovation activities. 	<ul style="list-style-type: none"> ✓ Integrate information and brokerage schemes for technology in the service portfolio of the innovation support infrastructure. 	Short-term	GITA
	<ul style="list-style-type: none"> ✓ Expand policy support in this area by introducing open competitive calls for innovation and technology upgrading, covering the whole innovation cycle from early-stage project development to product commercialization. 	Medium-term	GITA SRNSFG
<ul style="list-style-type: none"> The ample potential of demand-driven policies, such as targeting in public procurement, to drive innovative development has not been fully explored. 	<ul style="list-style-type: none"> ✓ Develop a comprehensive policy framework of public procurement for innovation to support demand-driven innovative development. 	Short-term	All ministries GITA Enterprise Georgia GNAS SRNSFG NIA State Procurement Agency
	<ul style="list-style-type: none"> ✓ Ensure that selection criteria in tender specifications are open to innovative solutions (Georgia, State Procurement Agency, 2020). 	Medium-term	GITA State Procurement Agency
	<ul style="list-style-type: none"> ✓ Undertake small demonstration projects to raise awareness about policy commitment and resulting opportunities. 		
	<ul style="list-style-type: none"> ✓ Consider adopting a pre-commercial procurement approach comparing R&D alternatives and identifying the solutions that offer the best value for money that the market can deliver to modernize public services. 		
	<ul style="list-style-type: none"> ✓ Align public procurement goals with existing policy initiatives supporting different areas of innovation (for example, support instruments for technical and business services, R&D grants, tax incentives). 		

Source: UNECE.

Sub-pillar V: Research and education

Recognizing the requirements of today's labour markets and rapidly evolving technological environment, governments have pursued a multidisciplinary approach to education through STEM initiatives. Policy measures to enhance research are designed to promote research excellence, collaboration and commercialization.

Policies to increase the number of STEM graduates

The academic disciplines of science, technology, engineering and mathematics (STEM) are priority fields for the State, and specific policies aim to increase the number of Georgian students enrolled in STEM subjects. Examples include subsidies through study vouchers that cover university tuition fees. The Government updates the list of faculties offering these subsidies each year, after assessing student mobility patterns and identifying weaker academic programmes. The number of STEM specialists has increased since 2016 as a result of the Millennium Challenge Account. Georgia offers qualified students partial scholarships to San Diego State University in the United States in cooperation with three Georgian state universities – Tbilisi State University, Ilia State University and Georgian Technical University – providing students with the opportunity to earn US degrees in STEM fields.⁹ Despite the programs in place, a significant number of workers remain unspecialized and the challenge of building a skilled work force persists.

Policies to foster research development

Since 2018 the SRNSFG has funded the research projects of nearly 100 doctoral candidates in Georgia. Of the Foundation's 2018 budget of \$32 million, \$25 million goes to research funding. Through the goodwill of the EU, Georgia receives a refund of half of its annual payment for associate membership in the EU's Horizon 2020 framework programme; and the SRNSFG subsequently reinvests those funds in R&D. The SRNSFG also funds both fundamental and applied research projects through grants and works towards building a sound foundation of cross-border cooperation in research by managing joint calls and projects with the foreign research centres and councils of France, Germany, Italy, Turkey and Ukraine. Such projects include Black Sea Horizon 2015–2018 and the STI International Cooperation Network for Eastern Partnership Countries Plus (EaP PLUS), both of which aim to stimulate cooperation between researchers from Eastern Europe and the Caucasus and the EU as part of Horizon 2020. In 2019, the SRNSFG inaugurated the Georgian Studies research programme and international conference in collaboration with the University of Oxford.

Sub-pillar V IPO evaluation and recommendations

Achievements

- ✓ Competitive grants are distributed for fundamental and applied research projects, providing incentives for innovation in public research institutes.
- ✓ Incentives for the development of STEM education have expanded to include partial scholarships in partnership with foreign universities.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Low funding for R&D from public and private sources impedes innovative development. 	<ul style="list-style-type: none"> ✓ Increase the overall level of R&D funding by increasing funding for policy support from public budgets (gross expenditure on R&D), promoting participation in international research funding schemes (such as Horizon 2020) and crowding in private investment in R&D. 	Medium-term	National government
<ul style="list-style-type: none"> • The low numbers of inventions and patents reveal the need to absorb technology spillovers from abroad. 	<ul style="list-style-type: none"> ✓ Foster cross-border cooperation in research by developing special programmes with allocated budgets to enable cross-border knowledge and experience sharing and to undertake joint research activities in priority areas. 	Medium-term	GNAS
	<ul style="list-style-type: none"> ✓ Strengthen support for public research institutes and businesses to participate in international calls. 		
<ul style="list-style-type: none"> • The large pool of unspecialized workers highlights the importance of increasing the number of STEM graduates to build a knowledge-based society. 	<ul style="list-style-type: none"> ✓ Build a STEM community engaging educators and individuals within and outside a formal educational setting to popularize STEM education and make technical careers more accessible. 	Short-term	MESCS SRNSFG
	<ul style="list-style-type: none"> ✓ Expand support schemes for students enrolled in STEM fields to include partial and full scholarships. 		
	<ul style="list-style-type: none"> ✓ Establish an online resource for finding STEM education-related activities and funding opportunities. 		
	<ul style="list-style-type: none"> ✓ Build computational literacy by promoting cybersafety and digital literacy and creating digital platforms for teaching and learning. 	Medium-term	

Source: UNECE.

Notes

- ¹ Enterprise Georgia, Trade with Georgia: Georgian products at the International Food and Drink Exhibition SIAL Paris 2018, press release, 17 October 2018.
- ² Georgia, MESCS (Ministry of Education, Science, Culture and Sport), Vocational Education Hackathon, press release, 24 April 2019.
- ³ Georgia, MoESD (Ministry of Economy and Sustainable Development), Informative Meeting on Credit-Guarantee Scheme State Programme, press release, 1 April 2019.
- ⁴ GITA (Georgia's Innovation & Technology Agency), 650 000 GEL Innovation matching grants, press release, 21 May 2019.
- ⁵ Georgia, Data Exchange Agency, Ministry of Justice, "CYBER-EXE Georgia 2015" – Cyber exercises for the representatives of public and private organizations, press release, 27 November 2015; GITA (Georgia's Innovation & Technology Agency), 650 000 GEL Innovation matching grants, press release, 21 May 2019.
- ⁶ Enterprise Georgia, Results of the State Program "Produce in Georgia", 12 November 2019.
- ⁷ Sakpatenti (National Intellectual Property Center of Georgia), Distance learning, <http://www.sakpatenti.gov.ge/en/page/181/>.
- ⁸ SRNSFG (Shota Rustaveli National Science Foundation of Georgia), SRNSFG announces 2019's Call for Applied Research Grants, 20 November 2019.
- ⁹ United States, Embassy in Georgia, MCC vice president celebrates first commencement of San Diego State University in Georgia, press release, 5 June 2019.

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- SRNSFG (Shota Rustaveli National Science Foundation of Georgia): <https://rustaveli.org.ge>

Chapter V

PILLAR III: INNOVATION POLICY PROCESSES

Pillar III examines the underlying processes for innovation policymaking: how data, evidence and stakeholder input inform how decisions are made, put into practice, monitored and evaluated, based on the experience from one specific policy. Ten detailed policy indicators address each step in the policy process of that specific policy, from problem identification or market failure to policy design, implementation, evaluation, impact assessment and learning.

In consultation with Georgia's Innovation and Technology Agency (GITA), UNECE selected the Start-up Matching Grant Programme (SMGP) for assessment, on the basis of these criteria:

- i) The policy measure is intended to foster science, technology and innovation (STI) in the country.*
- ii) The policy measure reflects the standard innovation policy practices in the country.*

Pillar III also derives broader policy lessons for innovation policymaking.

Innovation policy processes – strengths and weaknesses

Despite significant democratic and governance reform over the past 10 years, the policy design, development and coordination system in place within Georgian line ministries and other government bodies with STI policy competencies is still not fully functional. Gaps in the practices of planning and making policy affect the quality of policies and hence the innovation performance of the country.

Nonetheless, the specific policy examined in detail here, the SMGP, is a well-designed programme with a solid implementation record and a justified place in Georgia's current policy and economic landscape. It follows international good practices for matching-grants schemes and has benefited from the extensive experience of the World Bank with such schemes. To enhance the quality and impact of this and future schemes, GITA, which administers the SMGP, should consider improving targeting, bolstering anti-fraud measures and implementing mechanisms to increase the financial return on investment.

Policy overall: progress and gaps

Georgia has made progress in establishing key institutions and processes for democratic and good governance since 2000. The DCFTA, which came into force in July 2016, has further focused governmental efforts to reform public administration, including improving the quality of policymaking, professionalizing the civil service, improving access to public services, promoting greater accountability and transparency of public institutions, and fighting corruption (SIGMA and OECD, 2018; UNDP, 2019).

According to a 2018 survey commissioned by the Support for Improvement in Governance and Management (SIGMA) initiative and the OECD, 60 per cent of Georgian businesses consider governmental policymaking to be clear and stable, while 75 per cent believe that information on the laws and regulations affecting their businesses is easy to obtain from the authorities. These are positive numbers. Nonetheless, the policy development and coordination system in place today is still not fully functional, with significant gaps remaining in both the framework and the practices of planning and making policy (SIGMA and OECD, 2018).

Policy focus: matching-grants programmes and the SMGP

Matching grants are a form of direct subsidy to enterprises. They are “one-off, non-reimbursable transfer[s] to project beneficiaries [...] based on a specific project rationale for particular purposes and on condition that the recipient makes a specified contribution for the same purpose or subproject” (IFAD, 2012, p. 8). As such, they differ from permanent public transfers such as social security or subsidies for inputs and services (IFAD, 2012). In the innovation policy sphere, matching-grants programmes usually aim to stimulate enterprise innovation and defray some of its risk by helping entrepreneurs confront the high financial costs of experimenting with new ideas.

Matching grants require substantial budget resources and risk encouraging rent-seeking and market distortions. For these reasons, they should target a well-identified market failure, specific beneficiary groups that have a verified demand, and the potential for additionality and spillovers (IBRD and World Bank, 2016). This is particularly true in countries with limited fiscal space and a strong need to maximize the impact of public spending, such as Georgia and the rest of the EESC.

Successful design and implementation (box V.1) require time and resources, starting with the analytical underpinnings. Failure to take all the steps is likely to result in suboptimal outcomes, such as limited additionality and spillovers, weak demand and disbursements, and unintended consequences on the service provider market (such as a price increase if the supply is inelastic) (IBRD and World Bank, 2016).

GITA launched the SMGP in 2018, targeting small private enterprises not older than two years. Distributed during three financing cycles across three years, its grants go up to GEL 100,000, with minimum co-financing of 10 per cent by the beneficiary. Financed projects may last up to one year, and beneficiaries can spend the grants on almost any costs that derive directly from the requirements of their projects. Under the SMGP GITA had disbursed GEL 5.5 million as of March 2020 and aims to disburse an additional GEL 5.4 million by March 2022.

Box V.1

Success factors in designing and implementing matching-grants schemes

A recent review of 106 World Bank–implemented matching-grants schemes (IBRD and World Bank, 2016) identified six success factors in their design and implementation:

- i) Early presentation of the functioning of the scheme to stakeholders
- ii) Provision of personalized technical assistance to beneficiaries
- iii) Mitigation measures to avoid political capture
- iv) Selection of service providers by beneficiaries
- v) Transparent selection criteria for beneficiaries
- vi) A level of subsidy that makes the scheme attractive but does not diminish ownership

The eligibility criteria are relatively unrestrictive: companies must be “technology based” and cannot be related to defence, nuclear technologies, spirits, tobacco or hazardous substances; applicants must fill out a basic environmental and social checklist, which GITA uses to assess environmental and social risk. Applications are assessed in three stages: desk review, pre-evaluation and final evaluation. Decisions on allocating grants are made by an investment committee of international experts, on the basis of the innovation and content, market and commercialization potential, management and financial capacity, and sustainability of the projects.

Table V.1 Overview of sub-pillars and indicators for innovation policy processes

Sub-pillar I: Preparation	Sub-pillar II: Design	Sub-pillar III: Implementation	Sub-pillar IV: Post-implementation
Innovation foresight	Planning	Amendment of policies	Ex-post evaluation
Rationale	Decision-making	Review of the policy against its action plan	Adaptation
	Private sector consultation		
	Coherence		

Source: UNECE.

Sub-pillar I: Preparation

Sound preparation of policies sets the foundation for the policymaking process. Public intervention should, where appropriate, depend on the identification of market failures as well as future trends that will affect the area of intervention.

Innovation foresight

Innovation foresight – the practice of capturing future trends and perspectives in research activities and adjusting innovation policies accordingly – is not yet integrated systematically and continuously into the innovation policymaking process in Georgia, or into the processes for other policies. Foresight tends to be ad hoc, tied to specific policy design efforts (such as the new innovation strategy or the 2020 Sustainable Development Strategy) and not subject to continuous revision. This state of affairs means that measures such as the SMGP may not be grounded in agreed, realistic assumptions from which the key performance indicators (KPIs) follow, and that it may not be possible to monitor and evaluate impacts in a concerted fashion.

Policy rationale

The policy rationale for the SMGP derived from a comprehensive market-failure analysis that the World Bank conducted when conceptualizing and preparing the Georgia National Innovation Ecosystem (GENIE) project appraisal document. It identified market failures in the promotion of innovation and in participation in the digital economy. The overarching failure is the high cost of self-discovery, meaning that the potential social return from new, innovative activities is high, but the risk accrues fully to the entrepreneur and investors. This dampens private investment in those activities, producing the need for some public investment or coordination to initiate or sustain them (IBRD, 2016).

In the World Bank's 2013 Enterprise Survey, respondents in Georgia had identified lack of access to finance as the second most important constraint in the business environment. Only 12 per cent of micro and SMEs had loans in 2013; the rest financed their investments without debt financing. About 94 per cent of loans to micro and SMEs come from private commercial banks but with high collateral requirements – usually in the form of real estate, reaching as much as 220 per cent of the loan amount – as well as high interest rates and short terms. This makes loans an unlikely channel for long-term investment in capital stock. Banks are reluctant to fund innovative projects because of the high risks and their lack of understanding of the potential of such projects. Alternative financing sources, such as angel, seed and venture capital, or matching grants, or leasing and factoring, are largely unavailable from private sources in Georgia, and the nascent capital market infrastructure prevents easy exit from investment (IBRD, 2016).

For the GENIE project, under which the SMGP operates, the World Bank's cost-benefit analysis estimated that over a 20-year horizon the project will create a positive net present value of \$53.1 million, and an economic rate of return well above the social discount

rate at 18.9 per cent (IBRD, 2016). This kind of underlying analysis does not take place systematically for similar projects that are not funded and in part implemented by the World Bank Group or other international organizations.

Broader policy issues

In cooperation with GITA, World Bank experts conceptualized and prepared the SMGP in line with international good practices. In the broader sphere of policy not supported by international organizations, however, evidence-based policymaking is not yet fully established and the quality of the analysis supporting new policies and laws is relatively low (SIGMA and OECD, 2018). This is also true of the practices of the main line ministries in charge of innovation policy design, the MoESD and the MESCS. According to SIGMA and the OECD (2018), almost half of all laws in Georgia are amended one year after adoption, which indicates suboptimal preparation and vetting processes.

In developing policies, institutions in Georgia must provide general information about a proposed policy, explain its rationale and objective, identify its expected outcomes and assess its effects on the budget, under the rules of procedure of the Government and the Law on Normative Acts (Georgia, Administration, 2016). The established practice in developing policy, however, has been to merely use explanatory notes. The level of policy analysis underlying these notes is basic and its quality low. For example, the information provided about the rationale for introducing laws and policies and about their expected impacts is very limited (SIGMA, 2018).

In December 2019 the Government approved a new rule that aims to make government functioning more results-oriented and measurable through the use of a manual on policy planning, monitoring and evaluation. The manual, based on the Government's work with SIGMA, SIGMA's Principles of Public Administration and the SIGMA study referred to throughout this chapter (SIGMA, 2018), sets standards for planning, monitoring and evaluating policy. It represents a supplementary methodological guide for policymakers who carry out these tasks. The rule came into force on 1 January 2020; it remains to be seen how effectively the manual will be taken up by innovation policymaking and implementation bodies.

The Government has been allocating resources to establishing regulatory impact assessments¹ (RIAs), which line ministries consider as having a high benefit for improving the quality of both the stock and the flow of policies. RIAs have been piloted across several ministries for several years. Legislative amendments have been made to the normative acts, under which RIA became mandatory on 1 January 2020. The guideline and methodology for RIA were approved through a Government Resolution of Georgia (Resolution N35, dated 17 January 2020).

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ A comprehensive market-failure analysis was conducted when conceptualizing and preparing the SMGP. Market failures were identified in the promotion of innovation and in participation in the digital economy.
- ✓ A cost-benefit analysis was conducted for the GENIE project, concluding that it will create a positive net present value and an economic rate of return well above the social discount rate.
 - ✓ Using explanatory notes in policy development is an established practice.
- ✓ To improve the quality of the stock and flow of policies, RIAs have been piloted across several line ministries.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Innovation foresight is not yet integrated systematically and tends to be ad hoc and tied to specific policy design efforts. 	<ul style="list-style-type: none"> ✓ Integrate innovation foresight practices into the policy processes of relevant line ministries to capture future trends in and perspectives on research activities for incorporation in the long-term strategic direction of innovation development. 	Medium-term	MoESD MESCS
<ul style="list-style-type: none"> • Co-financing requirements for beneficiaries are low. 	<ul style="list-style-type: none"> ✓ Increase the co-financing requirements of GITA for beneficiaries of future financing rounds of the SMGP, once the SMGP has grown through its first financing rounds. 	Short-term	GITA
<ul style="list-style-type: none"> • The recently adopted Policy Planning, Monitoring and Evaluation Manual needs to be implemented. 	<ul style="list-style-type: none"> ✓ Implement and monitor the adoption of the Policy Planning, Monitoring and Evaluation Manual across the MoESD and the MESCS. 	Medium-term	Administration of Georgia
<ul style="list-style-type: none"> • Evidence-based policymaking is not yet fully established and the quality of the analysis supporting new policies and laws is relatively low. 	<ul style="list-style-type: none"> ✓ Build on efforts and experiences with RIAs by implementing the timeline and plan to institutionalize and implement RIAs, to ensure that drafters use evidence-based policymaking systematically when creating policies and laws. 	Medium-term	Parliamentary Secretariat

Source: UNECE.

Sub-pillar II: Design

Public-private consultations are an integral part of the policy design process, to ensure policy relevance to the market and private sector needs and to confirm the commitment of relevant stakeholders to its implementation. Innovation policy is a supplementary component of a country's overarching strategy that contributes to the achievement of broader vision and objectives of socioeconomic development. Its priorities and activities should be consistent and coherent with relevant "non-innovation" policies.

Planning

Overall, the SMGP's design seems to aim at achieving a strong uptake of the scheme. The grants are relatively large and the co-financing requirements very low. A 2012 review by the International Fund for Agricultural Development (IFAD) of matching-grants programmes shows that co-financing requirements are higher in other upper-middle-income countries. Low co-financing modalities are typically used for projects with high additionality or significant spillover potential in other countries (IFAD, 2012). Furthermore, despite the limited fiscal space of the government, GITA does not require an equity stake for itself in companies. In addition, the targeting is relatively loose; application and reporting procedures are lighter touch than for comparable matching-grants schemes in other countries.

The SMGP now monitors and collects KPIs quarterly and gathers qualitative and quantitative data through surveys twice a year. It has a clear action plan with two output indicators: the number of grants disbursed (156²) and the number of new products or services introduced in the market (200). GITA plans to introduce more detailed, project-specific indicators for the SMGP so as to measure the impact of the grants on individual firms. It does not seem to have plans to analyse the aggregate impact.

Decision-making

The targeting of innovative entrepreneurs and companies could be enhanced: it is not clear from the project manual how the programme ensures that beneficiaries are innovative. The only relevant criterion, that proposed projects be "technology based", indicates a focus on good uptake of the scheme to the detriment of other factors. The requirements for firm age and "technology" are unnecessarily constraining, especially when interpreting the latter narrowly – for example, Uber is not a technology company but a transport intermediary.

The focus on uptake by default reduces the focus on innovation and potential return. The SMGP's focus on social return is relatively weak. There is little systematic effort to vet projects from a sustainable development perspective, to make sure they do no harm and to give preference to those likely to make a strong contribution if successful. Furthermore, focusing on young firms raises the risk that the SMGP may miss innovative projects in established firms and that it may create distortions – for instance, if entrepreneurs register a different firm simply to qualify for support.

Public-private consultation mechanisms

The evidence points to limited, ad hoc involvement of the private sector and the public in the design of the SMGP. The design of the project was driven by World Bank experts and based on both the World's Bank significant experience and expertise in designing matching-grants programmes and international good practices. They used the 2013 World Bank survey of companies to identify relevant market failures and establish the rationale for the SMGP, so the private sector's views were taken on board, but the programme has no clear mechanisms for continuous dialogue to inform project implementation and monitoring.

Policy coherence

The SMGP is coherent with both the latest draft innovation strategy and the 2020 Sustainable Development Strategy. One of the core objectives of the draft innovation strategy is to "expand access to finance: Helping business access a more diverse and affordable range of capital is needed to improve the viability of securing the necessary financial resources to invest in innovation" (Majno and others, 2019; p.29). The Sustainable Development Strategy 2020 foresees the need to improve private sector competitiveness and expand private sector access to finance.

Broader policy issues

Across ministries, including those responsible for STI policymaking, both public scrutiny of government work and public participation in policy design are limited. Multi-stakeholder policymaking has yet to be fully developed. Details on policy proposals, for example, are not available to the public through a central online platform, as is standard practice in EU countries. Targeted stakeholders have been consulted on selected policy proposals through ad hoc working groups across several line ministries, but UNECE found that Government representatives consider the practice of consultation during policy design to be inadequate. The Policy Planning, Monitoring and Evaluation Manual, which came into force on 1 January 2020, has made public consultations on policy documents mandatory. It remains to be seen to what extent these consultation practices will be implemented.

The analysis found no evidence of systematic training on drafting policy for civil servants in ministries responsible for STI policies. Procedures for developing policy within such ministries are also not clearly defined and regulated.

Interministerial consultations are regulated through the Rules of Procedures; they are done using a specific e-government software programme. The SME Strategy 2016–2020, for instance, was developed and monitored by an interministerial working group chaired by the Deputy Minister of Economy. Yet, the groups involved in such consultations are under no regulatory requirements to issue formal opinions on draft proposals, and windows for commenting are reported to be very short. Policy drafts are shared between departments only when considered necessary. Thus, the current procedures and rules do not ensure that all relevant departments within ministries are consistently consulted and involved in developing policy proposals (SIGMA and OECD, 2018). The lack of regular inter- and intraministerial consultations is likely to cause missed opportunities for synergies. As an example, the several thousand grants that Georgia Enterprise disburses every year could easily be tweaked to complement GITA's efforts and to contribute more to incentivizing innovative projects rather than simply supporting projects that would have happened anyway.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ The SMGP has a clear action plan with output indicators. GITA plans to introduce more detailed, project-specific indicators for the SMGP to measure the impact of the grants on individual firms.
- ✓ GITA has adjusted the SMGP project manual for its third financing round, on the basis of lessons learned from the first two rounds. This is a positive development in terms of learning.
- ✓ The SMGP is coherent with both the latest draft innovation strategy and the 2020 Sustainable Development Strategy.
 - ✓ Interministerial consultations are regulated through Rules of Procedures and done with a specific e-government software programme.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Despite the limited fiscal space, GITA does not require an equity stake in companies. 	<ul style="list-style-type: none"> ✓ Integrate mechanisms for GITA to hold equity in beneficiaries' projects in future grant schemes, to augment the financial return on investment of public resources; refer to practices in other EESC countries, which have tried relatively simple mechanisms that do not disrupt entrepreneurs' operations. 	Mid-term	GITA
<ul style="list-style-type: none"> • Innovation targeting for SMGP beneficiaries is inadequate. 	<ul style="list-style-type: none"> ✓ Define eligibility criteria in more detail for future financing rounds, to ensure that projects with the greatest or most relevant innovation potential apply. One approach could be a tender on solving a particular problem in an innovative fashion. These types of tenders would be a strong motivation for innovative start-ups and scientists to commercialize their projects. 	Short-term	GITA
<ul style="list-style-type: none"> • The SMGP focuses too little on social returns, lacks outcome and impact indicators, and targets innovative applicants only loosely. 	<ul style="list-style-type: none"> ✓ Enhance efforts and mechanisms to further mainstream the three pillars of sustainable development across GITA policies and processes, by targeting explicit sustainability criteria to the eligibility of applicants for future grant schemes. These criteria could relate to gender or to subnational development issues, for example, or other priorities for the Government. 	Short-term	GITA
<ul style="list-style-type: none"> • The SMGP conducts only some measurement of outcomes and impact. 	<ul style="list-style-type: none"> ✓ Develop further the use of specific KPIs to enhance the precision of the monitoring and accountability of beneficiary projects. GITA should consider further development to include output, outcome and impact indicators, to focus more clearly on innovation, and to expand this approach to other policies and initiatives. 	Short-term	GITA
<ul style="list-style-type: none"> • Interministerial coordination rarely happens in designing innovation policy. Procedures for developing policy within ministries in charge of STI policymaking are not enforced. 	<ul style="list-style-type: none"> ✓ Consider establishing a more effective interagency consultation mechanism for Government bodies involved in implementing innovation policy. 	Medium-term	MoESD
	<ul style="list-style-type: none"> ✓ Establish more cross-cutting connections between these agencies and the MoESD. 		
<ul style="list-style-type: none"> • The private sector had little involvement in the SMGP design. Generally, across ministries, there is no systematic practice of public consultation for policy proposals. 	<ul style="list-style-type: none"> ✓ Consider developing and piloting a concerted approach to consultations of relevant line ministries with the private sector and the broader public on policy design and implementation, as part of the regular policy cycle and decision-making processes. 	Medium-term	MoESD MESCS

Source: UNECE.

Sub-pillar III: Implementation

Targets and time frames defined in the action plan provide a basis for regular reviews of implementation progress. Analysis of intermediate progress helps identify administrative, institutional and technical challenges faced during implementation and makes it possible to undertake necessary measures, including adjusting activity and reallocating resources.

Amendments of policies

Implementation of the SMGP is advanced and on track. One project financing cycle concluded in 2018 and two more began in December 2018 and July 2019, in line with the action plan. During the first cycle, the SMGP disbursed GEL 1.6 million, which was slightly below the target of GEL 2 million. As the prominence of the SMGP increases, it is expected that the numbers and quality of applicants will as well. Indeed, GITA staff confirmed that this was already the case in the second financing cycle.

GITA has revised the SMGP project manual for its third financing round, on the basis of lessons learned from the first two rounds. This is a positive development. It has eliminated the peer review of project proposals, the second round of proposal evaluation, as it did not significantly enhance the quality of proposals. It has streamlined the process and proposals now go directly to the investment committee for review.

Review of the policy against its action plan

The analysis found that the operational part of the SMGP implementation has been excellent. It is structured around a comprehensive and clearly drafted project manual (GITA, 2017) and a transparent selection process, well in line with the international good practices listed earlier in this chapter. The programme offers applicants personalized technical assistance by renowned business coaches at the business plan and pitch stages of the application process. It mitigates the risk of capture and rent-seeking by systematically and transparently involving the private sector in the grant award process through an investment committee that scores the shortlisted candidates following their pitches and by identifying transparent selection criteria in the project manual. The committee consists of five international experts from the private sector. To maximize the number of qualified applications, it conducts targeted and comprehensive marketing and promotion of the scheme through various media channels, delivering clear and accessible messaging geared towards start-ups. It also frees beneficiaries to select the service providers on which they spend the grant money, thereby implementing a demand-driven process rather than relying on services provided by central public institutions.

Broader policy issues

The analysis revealed three limitations of the SMGP. First, although GITA had not previously implemented a matching-grants scheme, it made no systematic training efforts to prepare staff to coordinate and implement the scheme. Adequate staff training is an important

success factor in the ability of agencies to implement matching-grants schemes (IBRD and World Bank, 2016), particularly when no experience with such schemes exists. Second, the measures in place to prevent fraud by grant beneficiaries are limited, in part as a result of the ambition to minimize bureaucracy and make the scheme accessible. The project manual refers to fraud by listing fraudulent actions to avoid. Third, the manual also stipulates regular field visits to monitor implementation and prevent fraud; to date, however, GITA has not visited many beneficiaries' sites.

Sub-pillar III		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ Implementation of the SMGP is advanced and on track with the action plan. ✓ The operational part of the SMGP implementation has been excellent. It is structured around a comprehensive and clearly drafted project manual and a transparent selection process, well in line with international good practices. ✓ GITA has adjusted the SMGP project manual for its third financing round, on the basis of lessons learned from the first two rounds, which is a positive development in terms of policy learning. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Staff received no specific training on implementing matching-grant schemes. 	<ul style="list-style-type: none"> ✓ Consider introducing targeted training schemes for GITA staff, when a policy measure is introduced or revamped. 	Short-term	GITA
<ul style="list-style-type: none"> • The measures in place to prevent fraud by grant beneficiaries are limited, in part as a result of the ambition to minimize bureaucracy and make the scheme accessible. 	<ul style="list-style-type: none"> ✓ Consider bolstering GITA's anti-fraud measures including conducting audits of projects, publicly disclosing fraudulent behaviour and conducting structured field visits, for future grants schemes – particularly those with very low co-financing requirements such as the SMGP – and for future financing rounds of existing schemes. 	Short-term	GITA

Source: UNECE.

Sub-pillar IV: Post-implementation

Ex-post evaluation is completed after the implementation of the action plan and based on results rather than forecasts. It helps establish the impact of policy activities on the industry in general, on specific fields or on beneficiaries. In light of experience acquired during implementation, governments introduce necessary adjustments to innovation policy measures so as to better target new or established policy objectives.

Ex-post evaluation

As the SMGP is still in implementation, this sub-pillar can be assessed only in part.

SMGP beneficiaries submit basic quarterly progress reports and financial reports. These are supposed to be followed by on-site visits, which GITA has never conducted.

The programme's KPIs (156 grants distributed and 200 products or services introduced to the market) are set for the end of the third disbursement cycle. For up to five years after the project ends, beneficiaries must provide periodic updates on performance data and financial information to GITA upon request. GITA may also ask beneficiaries to participate in thematic meetings that GITA organizes to present and discuss their experience before broader audiences. To structure and further flesh out the future evaluation details, GITA has hired two monitoring and evaluation managers.

GITA does not collect evidence from a comparable group of non-beneficiary firms, although "a robust randomized control trial is envisioned for [...] the matching grant program", according to the World Bank's Project Appraisal Document (IBRD, 2016, p.50).

The analysis found no evidence of an exit strategy. According to the SMGP's project appraisal document, it is assumed that as success stories increase, the perceived risk of funding innovative and/or risky ventures will decline, helping to crowd in new sources of financing (IBRD, 2016). Yet this ambition is not covered in the KPIs, nor is there a process for evaluating progress toward it.

Broader policy issues

Overall, monitoring and evaluation by the Government is insufficient and overly focused on outputs, with few systemic linkages to ensure that learning feeds into the policy design process, including in government bodies responsible for STI policy. Only limited evidence of any type of impact assessments of innovation policies was found across relevant ministries. The new Policy Planning, Monitoring and Evaluation Manual sets new standards for monitoring and evaluation. It remains to be seen to what extent relevant government bodies will apply them. For more detail on the monitoring and evaluation practices (or lack thereof) for individual innovation policies and measures, see chapter IV.

Sub-pillar IV IPO evaluation and recommendations

Achievements

- ✓ Beneficiaries of SMGP have some reporting requirements.
- ✓ Two monitoring and evaluation managers have been hired for the SMGP.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Monitoring and evaluation in the Government is insufficient and overly focused on outputs, with few systemic linkages to ensure that learning feeds into policy design. 	<ul style="list-style-type: none"> ✓ Implement RIA systematically, to enhance the quality of the flow and stock of laws and policies, given the scarcity of monitoring, evaluation and impact assessment practices in the policymaking process. 	Medium-term	Line ministries
<ul style="list-style-type: none"> • The SMGP lacks an impact assessment. 	<ul style="list-style-type: none"> ✓ Ensure the independence of impact assessments, ideally by having an external, independent assessor conduct them rather than internal staff. 	Short-term	GITA
<ul style="list-style-type: none"> • The SMGP offers scope for policy learning. 	<ul style="list-style-type: none"> ✓ Consider implementing in other agencies the good monitoring and implementation practices found in the SMGP, which has integrated some and plans to integrate others. 	Medium-term	Line ministries and implementation agencies
<ul style="list-style-type: none"> • Monitoring and evaluation has only a tenuous link with future policy design. 	<ul style="list-style-type: none"> ✓ Establish a more systemic linkage of monitoring and evaluation to policy design, including in government bodies responsible for STI policy. 	Medium-term	Line ministries and implementation agencies

Source: UNECE.

Notes

¹ According to the OECD (<https://www.oecd.org/regreform/regulatory-policy/ria.htm>), “Regulatory Impact Analysis (RIA) [sic] is a systemic approach to critically assessing the positive and negative effects of proposed and existing regulations and non-regulatory alternatives. As employed in OECD countries it encompasses a range of methods. It is an important element of an evidence-based approach to policy making. OECD analysis shows that conducting RIA within an appropriate systematic framework can underpin the capacity of governments to ensure that regulations are efficient and effective in a changing and complex world. Some form of RIA has now been adopted by nearly all OECD members”.

² This number also includes grants disbursed under a separate grant scheme, the Innovation Matching Grant Scheme.

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REP. OF MOLDOVA



Chapter I

ECONOMIC OVERVIEW

General overview

The Republic of Moldova is a lower-middle-income economy in Eastern Europe neighbouring Romania and Ukraine. Since independence it has seen economic and financial crises, drought and political instability. Declining macroeconomic stability is compounded by a mounting fiscal deficit, deindustrialization and heavy reliance on volatile flows of personal remittances. Yet, with its ready access to markets in the European Union (EU) and the Commonwealth of Independent States, the country has started to reap benefits from economic integration, with several sectors emerging as potential leading activities. To sustain and reinforce this momentum for sustainable, long-term growth will require economic stability and diversification through innovation.

Reform process

Since the country attained its independence in 1991, the economy has undergone a series of reforms, including large-scale privatizations, financial and trade liberalization, and democratization. The Government is maintaining this momentum with reforms of the pension system, the banking sector¹ and public administration² (Republic of Moldova, State Chancellery, 2020; USAID, 2020). This progress is reflected in the country's *Doing Business* rank, which rose from 90/183 in 2011 to 48/190 in 2019 (World Bank, 2020b). The slow progress on strengthening the rule of law and the lack of more structural reforms of the judicial system, however, leaves room for further improvement. Continued political instability may dampen the momentum and the severe banking crisis still holds back the accumulation of capital (box I.1).

GDP growth

Over the past two decades, after a sharp decline following the dissolution of the Soviet Union, the Republic of Moldova has sustained growth in gross domestic product (GDP), mainly driven by long-term productivity gains and the expansion of private consumption, remittances and fixed capital accumulation (figure I.1) (World Bank, 2016a). Despite both external and internal shocks, such as the 2008–2009 global financial crisis, the 2012 drought, the 2014 rouble devaluation and the 2016 banking crisis, the country has maintained macroeconomic stability, marking steady improvement in its economic performance relative to regional averages. GDP per capita in current US dollars increased

Box I.1 The banking crisis

In 2014 about \$1 billion disappeared from three of the largest commercial banks in the Republic of Moldova (Banca de Economii, Unibank and Banca Socială). That amount corresponded to more than 25 per cent of banking assets, or about 12 per cent of GDP. To contain the consequences of the crisis and with international support, in 2016 the Government launched a large effort to reform the banking system: it put the three banks under special administration by the National Bank of Moldova and introduced guarantee and reimbursement schemes as well as changes in legislation to tighten the sanctions for shareholders and bank managers as well as the lending rules (Republic of Moldova, 2018). In addition, reserve requirements for local currency debt more than doubled, from 14 per cent to 35 per cent, and two of the banks acquired new foreign investors, one of which is the European Bank for Reconstruction and Development (EBRD). Macroeprudential restrictions further constrained access to finance for businesses, weakening the investment climate (EBRD, 2017). Containing the crisis caused a rise in government debt; however, an intensive reform program has improved transparency and attracted international investors to the domestic banking sector. The rates at which consumer and real estate loans are made have managed to recover, thanks to the entry into force of the Basel III regulations in 2018 and a decrease in interest rates (to 3.25 per cent in 2020). The new deposit rates (5.71 per cent in December 2019 and 3.7 per cent in April 2020) also suggest sustained confidence in the banking sector despite the COVID-19 crisis. This confidence has yet to be felt in the area most important to innovation: credit to the private sector, which has declined considerably.

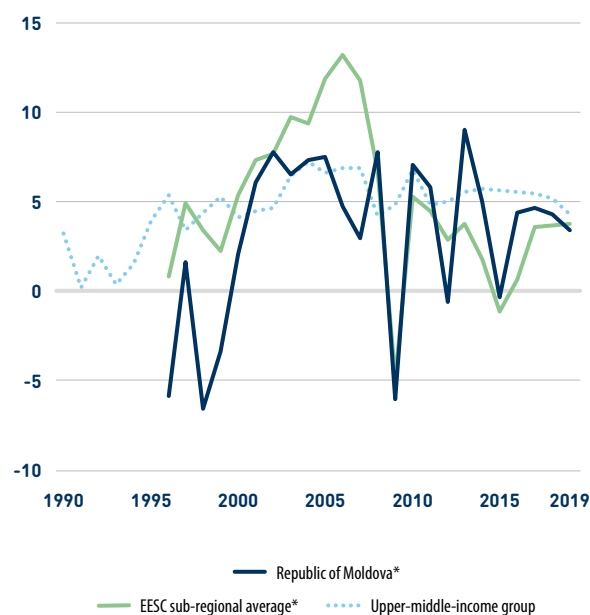
Sources: Gaibu and Knobel (2018); World Bank (2020a); IMF (International Monetary Fund), IMF Executive Board completes sixth and final review of Moldova's extended credit facility and extended fund facility, 11 March 2020.

from \$2,700 in 2015 to almost \$5,000 in 2019, and GDP per capita (based on purchasing power parity (PPP) in current international dollars) reached \$13,500. With average annual GDP growth of 4.6 per cent since 2000 and rising income levels, the past decade has seen strong domestic demand and rising exports (World Bank, 2020a).

Looking at GDP elements separately, labour productivity has been declining recently. Gross capital formation accounted for 26.3 per cent of GDP in 2019, an increase from previous years (22 per cent in 2016) and a partial recovery towards the levels preceding the 2008 financial crisis (39 per cent in 2008) (World Bank, 2020a). Personal remittances as a share of GDP are significant – almost 16 per cent in 2019 – making the country highly vulnerable to events such as the sharp drop in the Russian rouble in 2014.

Overall growth due to household consumption and rising public spending towards the end of 2019, specifically in capital and social spending, led to an increase in wages, and the current account deficit stabilized at about 9.7 per cent of GDP. Yet, the decline of both exports and remittances caused by the effects of the COVID-19 pandemic threaten to push this number to over 10 per cent (World Bank, 2020d). The significant presence of State-owned enterprises (SOEs) has concentrated the majority of resources in the less productive public sector, impeding the productivity of the private sector (World Bank, 2019b).

Figure I.1 • Annual GDP growth, 1990–2019 (Per cent)



Source: UNECE, based on data from the World Bank (2020a).

*Missing values for the Republic of Moldova, 1990–1995; Belarus, Armenia and Azerbaijan, 1990.

Foreign direct investment

Despite recent political volatility, the country's improving economic performance makes it attractive for foreign direct investment (FDI) (World Bank, 2020). Inflows increased from 2.7 per cent of GDP in 2018 to almost 5 per cent in 2019, the second highest in the Eastern Europe and the South Caucasus (EESC) sub-region (World Bank, 2020a). In 2009–2013, the majority of FDI inflows was market-seeking investment in non-tradable sectors, such as banking and transportation (Republic of Moldova, 2016). The National Strategy for Investment Attraction and Export Promotion 2016–2020 identified a need for increased efficiency-seeking FDI, and the low investment taxes and cheap labour costs are increasingly attracting such investment. The main targets are services, such as business process outsourcing and tourism, and manufacturing, which is underpinned by the country's Soviet-era industrial heritage. Employment in the automotive industry is growing; the country is a strong second- and third-tier supplier of car parts, concentrated in the free economic zones and attracting mainly Japanese and German investment.

Sectoral decomposition

Over the past two decades the economy has gone through a structural transformation from domination by agriculture and industry to growth in the share of services and trade in total output, mainly caused by inefficiencies and infrastructural weaknesses in the agriculture and industry sectors (Kintsurashvili and Kresic, 2017). Since 2014, industry (including construction) has contributed about 22 per cent of GDP and accounted for 16.8 per cent of employment, while manufacturing reached 10.9 per cent of value added GDP (World Bank, 2020a). Agriculture has significant, systemic productivity problems: in 2019 the sector employed 36 per cent of the active labour force, yet its output had declined from 30 per cent of GDP in 1996 to almost 10 per cent. Reliance on commodity prices and weather-dependent agricultural products, such as sunflower seeds, exacerbates the economy's exposure to both external and internal shocks, such as the 2012 drought, which caused major losses in export revenue. The expanding services sector accounted for 54.3 per cent of GDP in 2019, driven mainly by transport, tourism and services exports in the expanding information and communication technology (ICT) industry (World Bank, 2019b; 2020a). With a substantially low employment-to-population ratio in 2019 of 40 per cent, sectoral productivity must increase and the economy must find new engines for sustainable growth. Foreign-owned firms are among those with high productivity levels and represent an opportunity. Finally, the issue of the size of the informal sector, which accounted for about 30 per cent of the employed population in 2016 (World Bank, 2016b), remains to be resolved.³

Demographics

High outmigration, low fertility and an ageing population pose risks for the economy, suppressing the labour force – especially in terms of available skills – while reducing tax

revenue and increasing the burden of social policy liabilities. In 2019, the population growth rate was almost –2 per cent while the unemployment rate increased to 5 per cent (World Bank, 2020a). The high level of employment in small-scale agriculture indicates a systematic lack of other attractive employment opportunities, in particular for those with medium and low skill levels. Meanwhile, government liabilities for pensions and other social policies have led to growing and increasingly unsustainable deficits and pressure on the already constrained fiscal space (World Bank, 2019a).

External position

Sustaining the economy's robust GDP growth will increasingly depend on accelerating and solidifying economic integration. The EU Association Agreement and the Deep and Comprehensive Free Trade Area (DCFTA) have opened a range of opportunities. In 2018, trade (the sum of exports and imports of goods and services) stood at 84.3 per cent of GDP, and over half of it was with the EU (World Bank 2020c).

Nevertheless, diversifying the export basket is essential. According to the merchandise concentration index for exports, with values ranging from 0 (diversified) to 1 (concentrated), the Republic of Moldova scored 0.19 in 2018, the third most diversified in the EESC sub-region (average of 0.3) (UNCTADstat, 2020a). However, the high dependence on energy imports (World Bank, 2019b) and overreliance on low value added, commoditized exports make a rickety foundation for long-term sustainable development. Sunflower seeds were the second most exported product in 2018 at 5.9 per cent of total exports, after insulated wire (17.1 per cent) and before hot-rolled iron bars (5.19 per cent), wine (3.97 per cent) and seats (3.91 per cent) (OEC, 2020). Similarly, most of the country's revealed comparative advantages (RCA),⁴ specifically with values higher than 10, were in food and live animals, such as wheat, maize, and fruit and nuts, and in manufactured goods, such as iron and steel bars, and glassware (UNCTADstat, 2020b).

This dependence on a small group of commodities is reflected in the Competitive Industrial Performance (CIP) Index 2020, where the Republic of Moldova ranked 111/152, the second lowest in the EESC sub-region after Azerbaijan (120/150) (UNIDO, 2020). In the 2019 Global Competitiveness Index (GCI), the country ranked 86/141, an improvement on previous years, but still down from 2015 (when it ranked 82/140) (WEF, 2019). Its main strength was in ICT adoption (48/141).

Institutional quality

Inefficient governance can impede innovation processes needed for sustainable development. According to the World Governance Index, in 2018 the Republic of Moldova (–0.4) lagged behind the regional average (–0.3) for institutional quality, as proxied by the world average of indicators on the dimensions for rule of law, control of corruption, voice and accountability, and government effectiveness (IMF, 2018; Kaufmann and Kraay, 2020).

Sustainable development

Despite rising income levels and a low unemployment rate, the Republic of Moldova remains the poorest country in Europe. Its rural-urban divide continues to grow, with absolute poverty in rural areas almost five times higher than in urban areas (Republic of Moldova, National Statistics Bureau, 2020). Yet poverty levels overall have decreased significantly over the past two decades (World Bank, 2016c). The share of the population living below the national poverty line shrank from 54.6 per cent in 2001 to 9.6 per cent in 2015.

Like other countries in the sub-region, the Republic of Moldova still faces challenges in achieving gender equality (UNDP, 2020b). In 2018, the rate of female tertiary enrolment was 45.7 per cent (gross), compared with 34.1 per cent for male enrolment. In 2019 the labour participation rate was higher for men (46 per cent) than for women (40.5 per cent) (World Bank, 2020a).

Energy efficiency is relatively low, most significantly because of the inefficient consumption of heat in residential buildings. The country ranks 112/129 in GDP per unit of energy use (Cornell University, INSEAD and WIPO, 2019), largely due to its outdated energy infrastructure, and is almost entirely dependent on external sources of energy, with imports supplying more than 90 per cent of domestic consumption. A sustainable future will need a balanced combination of technology measures to reduce the dependence on energy imports and support the further exploitation of sources of renewable energy, such as biomass, wind and solar energy (IEA, 2020).

Synthesis

The table here presents the main achievements and challenges for the economic development of the Republic of Moldova, based on the findings in this chapter.

Progress made so far

- Maintained economic growth in the face of external and internal shocks over the past two decades
- Increased momentum, investment and diversification potential in manufacturing, especially in the automotive industry, and services trade (especially in ICT)
- Improved ease of doing business through regulatory reforms and facilitated market entry
- Decreased poverty and increased income levels

Challenges ahead

- Diversify production to reduce dependence on remittances, low value added activities and consumption so as to promote innovation, create decent jobs and generate positive spillover effects.
- Increase sectoral productivity and identify sustainable growth potential.
- Fortify the business environment to support private sector development, raising investor confidence.
- Strengthen institutional trust in political and economic governance by mitigating corruption.
- Increase efficiency-seeking and innovation investment.
- Improve energy efficiency and further reduce inequality to advance sustainable development.

Source: UNECE.

Notes

- ¹ EC (European Commission), EU report: The Republic of Moldova moved forward with key reforms, 12 September 2019.
- ² Republic of Moldova, Government approves pension system reform, 5 December 2016.
- ³ LO (International Labour Organization), Supporting Moldova in the formalization of informal economy, 8 January 2016.
- ⁴ The revealed comparative advantage (RCA) database, created by UNCTADstat, measures trade patterns between countries based on their relative productivity. It does not take into account national trade measures, such as subsidies and (non-)tariff regulations.

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Chapter II

INNOVATION PERFORMANCE OVERVIEW

Innovation climate

Despite facing a series of socioeconomic challenges over the past two decades, the Republic of Moldova has made significant progress towards improving the business environment, integrating into the international community and attracting foreign investment (chapter I). This creates opportunities to develop the sphere of innovation across all sectors of the economy, drawing on the economy's biggest asset – human capital. Before it can transform into a knowledge-based economy, though, the country must overcome a number of impediments. Low demand for innovation, insufficient funding for research and development (R&D), a skills mismatch in the labour market and an outdated education system obstruct the further development of an enabling environment. These factors are intensified by weak commercialization of innovative results, unevenly developed ICT infrastructure and low engagement of the private sector in R&D.

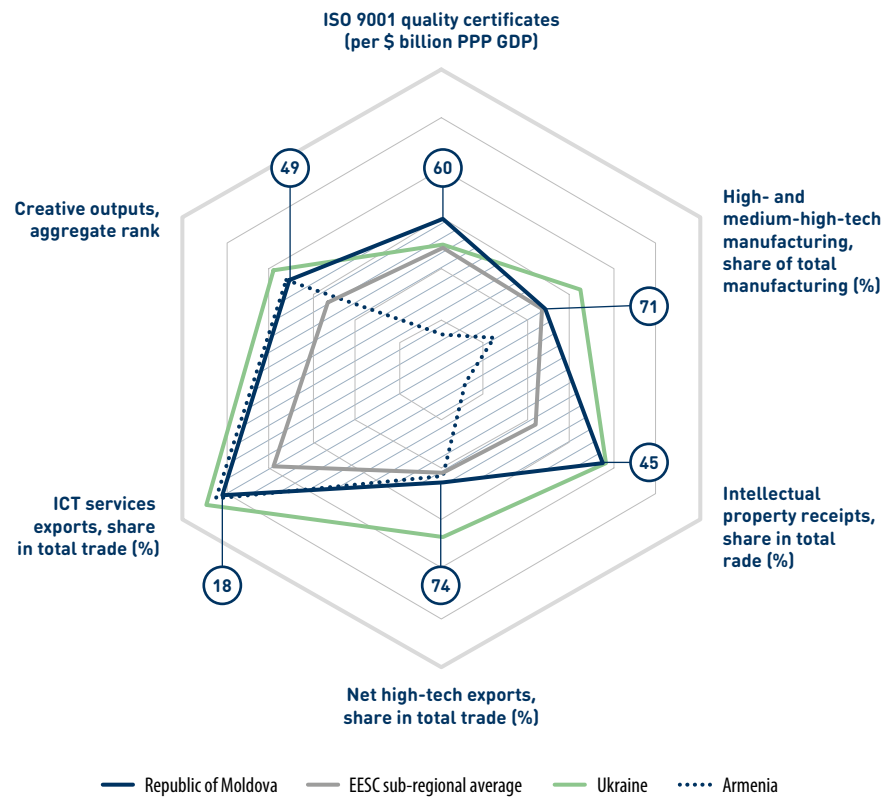
Innovation outcomes

In the 2019 Global Innovation Index (GII) report (Cornell University, INSEAD and WIPO, 2019), the Republic of Moldova was classified as an innovation achiever whose innovation performance exceeded expectations given the level of economic development. Overall, it ranked 58th, down 10 positions from 2018. In part, this change was caused by weaknesses in the national innovation system and the supporting policy environment (chapters III and IV). Nonetheless, it still performed strongly relative to the sub-region with regard to innovation outputs (figure II.1).

Performance on creative outputs (49th) was led by trademarks by origin (127.1 per \$1 billion PPP GDP) and industrial designs by origin (12.2), revealing two strengths relative to the rest of the income group. The country ranked 4th for utility models and 11th for industrial designs, closely following Ukraine on the global scale.

With regard to technological innovation, the Republic of Moldova performs above the sub-regional average on several key metrics – slightly higher than Armenia, Azerbaijan and Georgia in high- and medium-high-tech manufacturing (approximately 10 per cent of total manufacturing) and high-tech net exports (0.7 per cent of total trade) and substantially higher on intellectual property receipts (0.1 per cent of trade is revenues from selling or licensing Moldovan intellectual property abroad) and ICT services exports (4.2 per cent of total trade). These strengths also result, in part, from greater efforts to reform

Figure II.1 • Innovation performance by selected GII indicators, 2019 ranks



Source: UNECE, based on data from Cornell University, INSEAD and WIPO (2019).
Note: Lower values indicate stronger performance.

institutions and implement programmes to support small and medium enterprises (SMEs) (chapter IV). Nonetheless, the number of International Standards Organization (ISO) certificates has continued to decline, from 7.2 per \$1 billion PPP GDP in 2015 to 6.1 in 2018 and 4.6 in 2019. Although that number is the second highest in the sub-region, after Belarus, the decline suggests a need to upgrade technology.

The country's performance on non-technological assets, such as ICT business model creation (98th) and ICT organizational model creation (86th), leaves more room for improvement. The demand for firm innovation is low and commercialization processes are insufficiently supported, but more importantly, the private sector lacks in-house innovative capacities and mostly relies on acquiring foreign technologies (Raim et al., 2016). According to the National Bureau of Statistics of Moldova,¹ between 2017 and 2018, only 18 per cent of surveyed enterprises engaged in innovative activity: 40 per cent of these firms created innovative organizational models, 40 per cent created innovations in products and/or processes, and 20 per cent created innovations in both.

The ICT sector experienced significant growth between 2006 and 2014, accounting for nearly 10 per cent of GDP and employing approximately 3 per cent of the labour force in 2014, according to the European Commission (EC) (2014). Since then, however,

its growth has stagnated. ICT infrastructure remains unevenly developed across regions (EC, 2017), despite ongoing efforts to improve connectivity and broadband infrastructure (chapter IV). In 2019, ICT service imports increased to 1.9 per cent of total trade, outperforming the country's peers in the sub-region and revealing the high potential for developing the sector further. Attracting more FDI is the key to reaping the full economic benefits in the sector, according to a recent study on innovation competitiveness in the country (Dumitrasco, 2018).

Innovation activity – channels, strengths and weaknesses

Improved business regulatory procedures have fostered entrepreneurial endeavours, but the low value added of these activities leaves significant room for improvement. Microbusinesses constitute almost 75 per cent of all enterprises, yet according to the National Bureau of Statistics, the contribution of SMEs to the economy in 2018 amounted to 44 per cent.² Although improvements in the business climate have facilitated the creation of businesses (98.7 per cent of enterprises were SMEs in 2016), the incentives in place are insufficient for these businesses to innovate.

International knowledge transfer

The Republic of Moldova ranked 82/129 in the 2019 GII in the aggregate rank for knowledge absorption. Inward FDI constituted 2.2 per cent of GDP in 2019, ranking the country 77th. High-tech imports made up 7.4 per cent of trade, a higher share than in Azerbaijan, Armenia and Belarus (Cornell University, INSEAD and WIPO, 2019).

On the 2019 Global Competitiveness Index (GCI), three of the country's four best scores related to the enabling environment, specifically macroeconomic stability (73/100), ICT adoption (67/100) and infrastructure (66/100) (WEF, 2019). The lowest score was for innovative capabilities (30/100), specifically caused by a decline in the sub-scores for R&D investment and for commercialization.

Investment in R&D

Investment in R&D is not a national priority, as reflected in the national R&D investment target of 1 per cent of GDP by 2020 (Spiesberger and Cuciureanu, 2015). The EC's Horizon 2020 Background Report (2016) attributed this lack of priority to social issues, such as the low level of understanding of how R&D supports economic competitiveness and decreases reliance on remittances. Gross expenditure on R&D has in fact been declining over the past few years, falling below the sub-regional average to 0.25 per cent of GDP in 2018 (UIS, 2019; World Bank, 2020). Although higher than in Armenia and Azerbaijan, this share lags behind the allocations made in the other EESC countries.

Moreover, R&D investment in the Moldovan private sector is vital for the development of an innovation ecosystem; such investment depends significantly on the country's economic structure, specifically a greater concentration of low- rather than high-tech industries, as well as on FDI inflows from international investors (Raim et al., 2016).

Private sector R&D investment is extremely low, as identified in the 2017 GCI, where the country ranked 135/137 on company spending on R&D, underscoring the impediment that this factor presents to innovative development (WEF, 2019). This was confirmed in the Business Environment and Enterprise Survey (BEEPS) of the European Bank for Reconstruction and Development (EBRD) (2017a). An important factor for commercializing research is the linkages between industry and science, which require strengthening: University-industry research collaboration ranked 109th in the 2019 GCI, a weakness for the economy's innovative development.

With an ageing population of researchers and little attraction or retention of younger talent, the number of researchers per 100 people has steadily decreased, falling below the EU average. The 2019 GII further underscored that few Moldovan companies employ researchers and that the level of foreign investment in R&D is a major weakness for the country's innovative development: 3.7 per cent of gross expenditure on R&D originated from abroad, higher than in Azerbaijan and Armenia, but significantly lower than in Belarus (Cornell University, INSEAD and WIPO, 2019). To enhance competition and limit dependency on remittances, as well as to sustain and develop research capabilities, it is vital for the country to implement reforms that increase both public and private investment in R&D (Spiesberger and Cuciureanu, 2015).

Skills development

The low levels of R&D investment are mirrored in employment trends. As noted earlier, the labour force consists of approximately 40 per cent of the population; 26.5 per cent of the labour force is employed in knowledge-intensive activities, which remain at a modest level below the sub-regional average. This issue can be attributed to the significant mismatch between labour-market requirements and the skill level of labour-market entrants, as highlighted in the EBRD country strategy (EBRD, 2017b). Indeed, in the GCI (2018), the country ranked 73/140 on skills and 71/140 on labour market, with low ranks on the indicators concerning the hiring and firing practices (94) and cooperation in labour-employee relations (70) of talent. No Moldovan university is included in the Quacquarelli Symonds ranking, and the Programme for International Student Assessment scores in reading, mathematics and science remain relatively low compared with the rest of the EESC countries (Cornell University, INSEAD and WIPO, 2019).

Only about 40 per cent of the population enrolls in tertiary education, the second lowest share among EESC countries (World Bank, 2020), yet the Government's expenditure on education constitutes 6.7 per cent of GDP, the highest in the sub-region. To make optimal use of its human resources, counteract emigration trends and ensure the efficient use of public resources, the economy needs to attract and retain new talent.

Synthesis

The table here presents the main achievements of and challenges to R&D and innovation (RDI) in the Republic of Moldova, based on the findings described in this chapter.

Progress made so far

- Innovation investment is efficiently translated into outputs
- High level of tertiary education enrolment and government expenditure on education as a share of GDP
- ICT access and use are facilitated, while trade in ICT services has developed significantly

Challenges ahead

- Support further the development of technological and creative outputs.
- Modernize the education system to respond accurately to the needs of the labour market.
- Increase governmental and private sector R&D expenditure, and attract foreign investment in R&D.
- Strengthen industry-science linkages to improve research commercialization and collaboration.

Source: UNECE.

Notes

- ¹ Republic of Moldova, National Bureau of Statistics, Innovation activity of enterprises in the Republic of Moldova in the years 2017–2018, press release, 20 December 2019.
- ² Republic of Moldova, National Bureau of Statistics, Innovation activity of enterprises in the Republic of Moldova in the years 2017–2018, press release, 20 December 2019.

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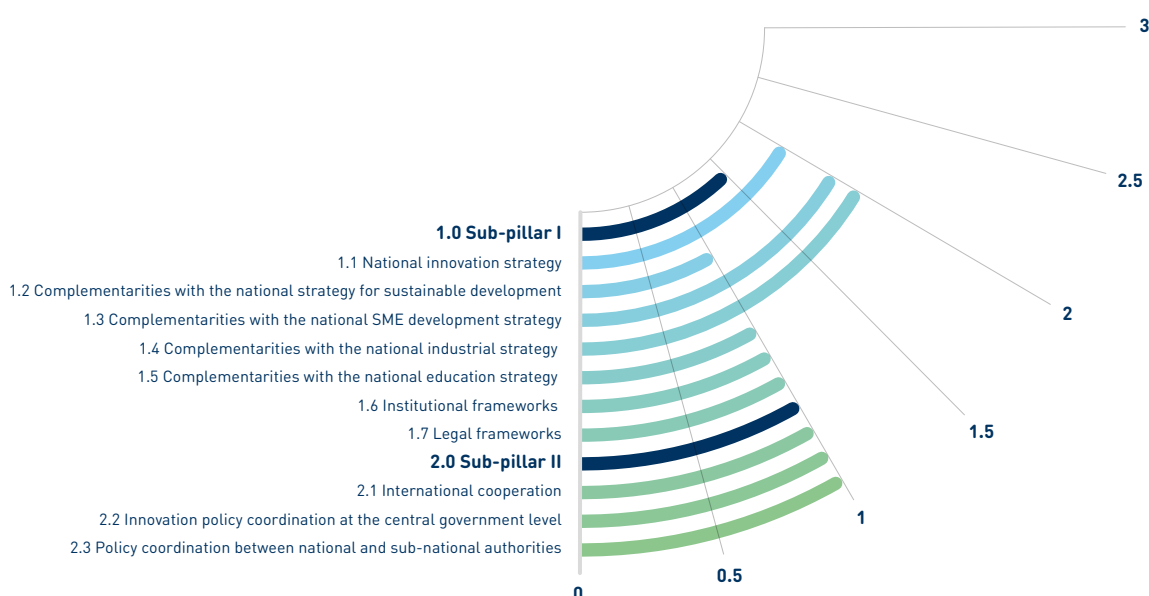
Chapter III

PILLAR I: INNOVATION POLICY GOVERNANCE

The first pillar of the IPO reviews the overarching strategic, institutional and legal framework for innovation policy, as well as the competences of and coordination among government bodies involved in innovation policy. This review assesses the extent to which innovation policy governance is sound, well-structured, efficient and flexible.

National innovation policy governance – strengths and weaknesses

Figure III.1 • Scoring of sub-pillars: innovation policy governance



Source: UNECE.

Note: Each indicator is assessed using a score from 3 to 0. The highest score (3) is given to fully fledged policy initiatives and mechanisms that can provide mutual learning opportunities for the EESC sub-region. A score of 2 is assigned if a policy initiative is operational. An indicator receives 1 point if a policy initiative is under development. The lowest score (0) is given if a country does not have a specific policy mechanism, strategic document or policy initiative. The indicators are based on an extensive questionnaire answered by national government agencies and external consultants. The questionnaire consists of open, binary and multiple-choice questions. Additional statistical data supplement the formal assessment framework by informing on key socioeconomic trends and context conditions. Statistical data are not directly integrated into the qualitative indicators but are used to guide scoring decisions. For more information, please refer to Methodology and Process.

Despite various socioeconomic challenges since its independence, the Republic of Moldova has managed to maintain several islands of research excellence in physics, chemistry and nanotechnology. To strengthen research capabilities and support innovation-led economic growth, the Government has implemented overarching reforms. Changes in the Code on Science and Innovation put the Ministry of Education, Culture and Research (MECR) in charge of most national research institutions and gave it responsibility for shaping the national research and innovation agenda. The National Agency for Research and Development (NARD) is the main public funder of research and innovation. The role of the National Academy of Sciences shrank: it is mainly a consulting body advising the Government on science and innovation policy.

The Moldovan Government has adopted strategic documents governing RDI activities (figure III.1). The National Programme for Research and Innovation for 2020–2023 is supported by an action plan that defines subsequent steps for achieving policy objectives. Priorities of the national innovation policy align with other overarching policy objectives anchored in strategic documents on education, SMEs and industrial development. The Government is working on integrating the Sustainable Development Goals (SDGs) into the national innovation agenda and on aligning the National Development Strategy 2030 with innovation policy needs. Legal and institutional frameworks related to research and innovation are still nascent.

Government bodies formulate and implement innovation policy initiatives in isolation, as no fully fledged coordination mechanisms exist at either the national or the subnational level. Other challenges that negatively affect the development of the knowledge economy include the weak financial sector, the lack of skilled labour, the low quality of public infrastructure, and the low numbers of scientists and researchers relative to the population (Spiesberger and Cuciureanu, 2015; OECD, 2016). As in many post-Soviet countries, weak collaboration between academia and industry remains a severe problem. According to the National Bureau of Statistics, in 2016 only 13 per cent of innovative companies had cooperation agreements with higher-education institutions (HEIs) and public research organizations.

Table III.1 Overview of sub-pillars and indicators for innovation policy governance

Sub-pillar I: Innovation Policy Frameworks	Sub-pillar II: Innovation Policy Coordination
National innovation strategy	International cooperation
Complementarities with other policy areas	Innovation policy coordination within the central government and between national and subnational authorities
Institutional frameworks	
Legal frameworks	

Source: UNECE.

Sub-pillar I: Innovation policy frameworks

Given the many government levels involved in the design and implementation of innovation policy, it is vital to have a strategic document that contains the Government's overarching vision.

National innovation strategy

The National Programme for Research and Innovation, which entered into force on 16 August 2019, provides a comprehensive vision and objectives for developing the national science and innovation system. The programme unifies a fragmented policy landscape previously governed by two strategic documents: the Innovations for Competitiveness Strategy 2013–2020 (developed by the Ministry of Economy and Infrastructure (MEI)) and the Research and Development Strategy until 2020 (developed by the National Academy of Sciences). Neither intermediary nor final assessments were conducted to assess the implementation of the two strategies.

Key themes of the National Programme for Research and Innovation are the adoption of both the SDGs and smart specialization approaches. The programme outlines key measures for achieving six national strategic objectives in science and innovation:

- Ensure better prioritization of science and innovation and their closer alignment with the needs of national socioeconomic development
- Leverage international collaboration to access funding, knowledge and skills
- Strengthen collaboration and promote synergies among stakeholders in science and innovation policy
- Promote science and innovation in society
- Create favourable conditions for supporting business innovation
- Increase the efficiency and effectiveness of public research funding

The objectives of the programme align with other strategic policy documents. For instance, supporting collaboration between stakeholders in national science and innovation policy and developing synergies between academia and industry also feature as topics of particular importance in the national SME Development Strategy, in SME laws (2007, 2016), and in the Law on Science and Technology Parks and Innovation Incubators. The National Programme for Research and Innovation specifies a group of research priorities to receive a 1 per cent annual increase in competitive funding from 2019 to 2023: health care, security and safety, environment and climate change, societal challenges, and economic competitiveness and innovation technologies. The action plan of the programme allocated funding for only seven policy actions in priority areas. Funding of other measures depends on the State budget laws.

Complementarities with other policy areas

Support for science and innovation is based on the National Programme for Research and Innovation, the National Education Strategy and the National Development Strategy.

No strong synergies exist among these policy documents, as government bodies develop science and innovation policy initiatives in isolation, without considering positive and negative externalities for other policy areas.

Goals for SMEs are set out in different strategies and in law. The SME Development Strategy aims to ensure that effective market competition exists and that innovation activities are promoted. The Law on SMEs dedicates an entire section to supporting innovation and internationalizing domestic firms. According to the law, government authorities are required to (a) facilitate collaboration between SMEs and academia; (b) facilitate adoption of new technologies by SMEs; (c) support capacity-building in research and innovation for SMEs; (d) facilitate the development of innovation support infrastructure for SMEs, including science and technology parks, industrial parks, ICT parks, business incubators, research laboratories, and information and consulting centres; (e) facilitate the cooperation of SMEs with large enterprises through cluster initiatives; and (f) simplify access to public research infrastructure, facilities and equipment for SMEs. The National Development Strategy 2020 also establishes goals for SMEs: increasing the number of such firms and the number of their employees by 65 per cent and raising their contribution to GDP by 38 per cent.

The contribution of digital products and services to economic growth is growing. In 2017, exports of ICT services amounted to 13.92 per cent of GDP (in the form of computer data-related transactions and computer and communications services). The National ICT Industry Competitiveness Road Map 2023 establishes measures to improve ICT infrastructure, develop skills and competences, and create a favourable business environment. In addition to promoting digitalization of the economy, the Government supports the digital transformation of the public sector; however, the lack of continuous efforts and changing policy priorities mean that digital government is not well developed.

The National Education Strategy 2020 acknowledges the weak linkages among HEIs, public research institutions and the business sector, noting the rather inefficient mechanisms of interaction between them and the labour market. The quality of research in HEIs remains quite low. The strategy promotes research as a tool for advanced professional training and as a mechanism for promoting the quality of higher education. To achieve that, it specifies three actions:

- Elaborate minimum standards of research performance required for obtaining scientific titles.
- Allocate separate funding for doctoral programmes.
- Design mechanisms to attract young people to the pursuit of research careers.

In addition, the Education Code contains a section on support for research in HEIs.

Public project-based funding of RDI activities comes from the NARD. In addition, HEIs may benefit from institutional funding for research and innovation in accordance with the Code on Science and Innovation. HEIs are the sole owners of all intellectual property generated from their research activities that are financed from the State budget and can use the revenues from commercializing that intellectual property at their discretion.

Another document with a potential impact on RDI is the National Development Strategy 2030. It includes four pillars of sustainable development, based on 10 long-term objectives:

- A sustainable and inclusive economy (reduced economic inequalities, greater access to public infrastructure and facilities, improved working conditions)
- Robust human and social capital (good-quality education for all and promotion of lifelong learning opportunities, creation of conditions for the best physical and mental health, development of an inclusive social protection system, life-work balance)
- Transparent and efficient government institutions (strengthened rule of law, promotion of a safe and inclusive society)
- A healthy environment for individuals (ensuring the fundamental right to a healthy and safe environment)

The targets of the National Development Strategy Moldova 2030 are based on the SDGs. The plan is to monitor and evaluate their achievement using a set of international benchmarks, mainly indicators of the EU and rankings of international organizations. The Government sees research, education and innovation as the main drivers of sustainable development.

Institutional frameworks

Several government bodies play roles in science and innovation. Since 2017, the national innovation policy has been mainly shaped by the MECR. The MEI shares responsibility for supporting innovation activities, but its impact is rather limited and the new regulation on its organization and tasks does not mention innovation among its competence areas. The Ministry of Agriculture, Regional Development and Environment and the Ministry of Health, Labour and Social Protection oversee some research institutes and research centres. In 2018, the former developed an action plan to support agricultural research and support collaboration between academia and business in the agriculture sector. The National Academy of Sciences is responsible for performing research activities, advising the Government on science and innovation policy, and supporting international collaboration on research.

The Ministry of Finance defines the national budget and establishes procedures for financial monitoring and for assessing and evaluating projects that receive RDI funding. In 2018, the Government established the NARD to allocate project-based funding; before that, the state budget for R&D was managed mainly by the National Academy of Sciences. The NARD offers funding for four project types: state research programmes, technology transfer projects, international research projects and projects for postdoctoral research. In 2020, it allocated \$11.3 million to research projects and \$440,000 to innovation and technology transfer projects. Private and public entities as well as members of entrepreneurs' associations can apply for funding. Sectors such as high-performance computing, energy and forestry are among the priority areas. The agency seeks to use available funding to provide targeted support for spin-off companies. Its Council selects projects on the basis of feedback from independent national experts, with final choices made by the general director. The agency assesses projects (for four years) by comparing results and planned indicators. The main criteria are volume of exports, investment, staff increase and project duration.

Governance of public institutions remains insufficiently developed (Spiesberger and Cuciureanu, 2015; EBRD, 2017). That poses serious barriers to the growth of innovation and entrepreneurial activities. Reforms of judiciary bodies have produced overregulation of RDI activities and excessive bureaucratization, decreasing the efficiency and effectiveness of the national science and innovation system.

Legal frameworks

The Code on Science and Innovation, adopted in July 2004, is the main policy document that sets frameworks for developing the national science and innovation system. It defines the main activities, the actors and their relationships, and the goals of science and innovation activities; it also sets mandates for government authorities. According to the Code, the major goal of the State policy is to achieve sustainable socioeconomic and human development that is based on making progress in science and technology and on creating and commercializing research outputs effectively. It serves as a basis for establishing quality assurance mechanisms in Moldovan research.

The National Agency for Quality Assurance in Education and Research is the main government body responsible for assessing and evaluating the national science and innovation system. Government authorities in Moldova do not have sufficient capabilities to enforce the laws as intended, and laws on entrepreneurship and innovation are not always implemented as intended. According to the Law on SMEs, financial control bodies may audit SMEs only once within the first three years of operation and are not allowed to fine these companies during this period. Government inspectors do not fully abide by this rule and expose SMEs to greater scrutiny that is not always justified. Frequent inspections result in interruptions of business activities and negatively affect entrepreneurship in the country. Excessive and complex regulation of business is detrimental to the growth of both SMEs and innovation.

Apart from irregular implementation of legal frameworks and overregulation, another challenge is legislative gaps. Missing are laws on FDI, venture capital investment and spin-offs. The Law on Investments No. 81/2004 provides a governance framework for FDI. Although many policy documents in the last 25 years mention venture capital investment, the country does not have a fully fledged legal framework governing such investment. The action plan of the Innovation for Competitiveness Strategy envisaged the elaboration of a law on venture capital in 2014. The same activity was included in the earlier action plan for the implementation of the SME Development Strategy 2015–2017. Neither of these plans translated into real actions.

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ The Government has made a strong commitment to reforming the national science and innovation system.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Funding of RDI activities is suboptimal. 	<ul style="list-style-type: none"> ✓ Increase public expenditure on R&D to create conditions for an innovation-driven economy. 	Medium-term	Government
	<ul style="list-style-type: none"> ✓ Raise expenditures jointly with making efforts to improve the accountability of both recipients and funders, as well as the quality of governance. 		
<ul style="list-style-type: none"> • Government services are not sufficiently digitalized. 	<ul style="list-style-type: none"> ✓ Increase efforts to develop digital government platforms, so the Government leads by example in the digital transformation of the society and economy, creating demand and setting standards for digital solutions. 	Medium- to long-term	MEI Agency for E-Government
<ul style="list-style-type: none"> • Legal instruments are not sufficiently developed to fully support innovation activities. 	<ul style="list-style-type: none"> ✓ Adopt regulation on FDI, venture capital investment and spin-offs to support innovations in the business sector. 	Short-term	Government

Source: UNECE.

Sub-pillar II: Innovation policy coordination

Coordinated approaches help avoid overlapping, duplicating or omitting actions required to implement innovation policy successfully.

International cooperation

The Republic of Moldova has strong historical linkages with countries that have long scientific and technological traditions. It maintains cooperative efforts with post-Soviet states on a number of joint research projects; for instance, Moldovan scientists conduct research with their international peers at the Joint Institute for Nuclear Research in Dubna. The scope of international cooperation is extensive. The country is a partner in the EU Water Joint Programming Initiative and in ERA.Net RUS Plus. It has agreements with the Romanian Ministry of Education and Research, the German Federal Ministry for Education and Research, the National Research Council of Italy, the French National Centre for Scientific Research, the Belarussian State Committee on Science and Technology, and the Scientific and Technological Council of Turkey.

The Republic of Moldova is the only country in the post-Soviet space to have become an associated member of the EU Framework Programmes for Research and Innovation, which occurred in 2011. In 2014, it deepened its cooperation with the EU by joining the DCFTA and signing an agreement on a visa-free regime with the EU member countries. National science and innovation priorities are congruent with the priorities of the Framework Programmes, yet because of the immaturity of the national science and innovation

system, among other reasons, the country has not been able to benefit fully from them. Nevertheless, over the last decade, domestic RDI organizations have accumulated the knowledge and expertise required to foster cooperation with EU partners and apply for international funding.

Given the country's close relations with the EU, the development of research and innovation is largely shaped by the priorities and trends of the European Research Area. The 2019–2021 Road Map for the Integration of the Republic of Moldova into the European Research Area seeks to build the capabilities and skills of domestic institutions to apply synergies from this cooperation with the EU effectively to advance domestic research and innovation. The Road Map contains six objectives:

1. Develop an effective national research system.
2. Support international cooperation to jointly address grand challenges and develop joint research infrastructures.
3. Create favourable conditions for an open labour market for research personnel.
4. Reach higher levels of gender equality in research.
5. Promote open access and open science.
6. Strengthen international cooperation in research and innovation.

Actions under the Road Map align with the National Research and Innovation Programme. One of that programme's general objectives is to foster internationalization. It establishes measures to improve the ability of Moldovan organizations to benefit effectively from the Horizon 2020 programme and to support organizations in preparing the national capabilities for the next EU Framework Programme, Horizon Europe.

The ability of Moldovan firms to integrate into global value chains is burdened by outdated industry standards and product certifications. Greater alignment with international norms would open new opportunities for Moldovan exports and contribute to creating new jobs. Adoption of the standards of the EU and the Eurasian Customs Union could make Moldovan enterprises more competitive globally.

Innovation policy coordination within the central government and between national and subnational authorities

The Republic of Moldova does not have fully functioning mechanisms and approaches that make it possible to coordinate science and innovation policy. The Innovation for Competitiveness Strategy 2013–2020 and the Research and Development Strategy 2020 included plans to establish an interministerial council to coordinate State programmes on science and innovation. Plans also existed to set up a consultative committee for research and innovation, comprising public and private stakeholders; however, these plans have never been implemented.

Each national ministry creates its own initiatives to support research commercialization and innovation activities, leading to fragmented use of resources, greater administration costs and less transparency and producing only moderate impacts on support for RDI activities. The parallel funding schemes with the same objectives and similar designs do not provide the intended results for socioeconomic development.

The regional aspect of science and innovation policy is not developed, as there are neither regional innovation agencies, nor regional science and innovation strategies. Instead, Moldova has four regional development strategies: the Regional Development Strategy North 2016–2020, the Regional Development Strategy Centre 2016–2020, the Regional Development Strategy South 2016–2020 and the Regional Development Strategy of Gagauzia 2017–2020. The strategies define actions and goals for implementing the National Strategy for Regional Development. Although the regional strategies do not address innovation support, they do outline goals for improving the quality of governance by local authorities and for creating the conditions for sustainable economic growth.

Sub-pillar II IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Public research organizations and HEIs have experience in participating in international funding calls. ✓ A large number of international agreements in RDI exist with countries that are advanced in science and technology. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • No functioning mechanisms exist for coordination among science and innovation policy stakeholders. 	<ul style="list-style-type: none"> ✓ Establish strong communication channels among government authorities with responsibilities for science and innovation. 	Medium-term	Government
<ul style="list-style-type: none"> • No regional science and innovation policy exists. 	<ul style="list-style-type: none"> ✓ Integrate a science and innovation policy dimension into the design of regional policies. 	Medium- to long-term	National and regional governments Ministry of Agriculture Regional Development and Environment
	<ul style="list-style-type: none"> ✓ Ensure regional authorities obtain all necessary competences to successfully steer science and innovation policy initiatives. 		
<ul style="list-style-type: none"> • Industry standards and product certifications do not fully align with international standards. 	<ul style="list-style-type: none"> ✓ Implement international quality standards and product certifications in order to enable domestic enterprises to integrate into global value chains. 	Medium-term	MEI

Source: UNECE.

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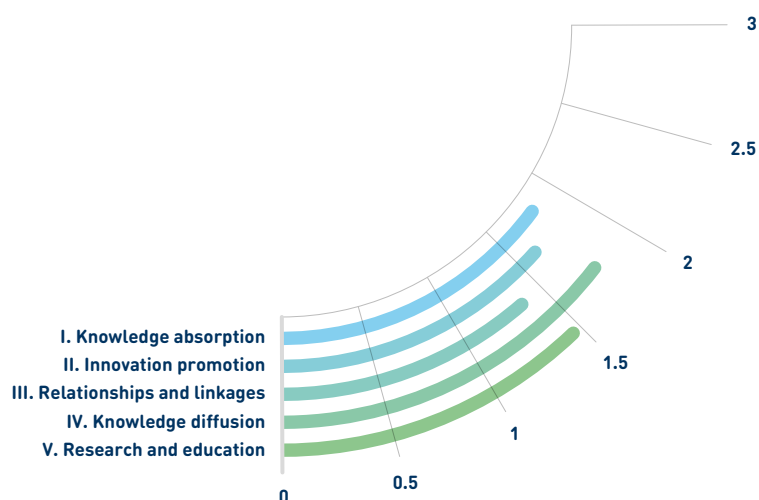
Chapter IV

PILLAR II: INNOVATION POLICY TOOLS

This chapter reviews the existing policy mechanisms in the Republic of Moldova that enable, promote and diffuse innovation. It addresses five sub-pillars: knowledge absorption, innovation promotion, relationships and linkages, knowledge diffusion, and research and education.

National innovation policy mix – strengths and weaknesses

Figure IV.1 • Scoring of sub-pillars: innovation policy tools



Source: UNECE.

Note: The IPO pillar scoring is calculated on the basis of the average quantitative assessment of individual indicators under each sub-pillar. In the evaluation all support measures in a given area are taken into account and special consideration is paid to indirect contributions from external mechanisms. The overall band score for each sub-pillar forms the following generalized categories: 0.0–0.5, No policy instruments/mechanisms exist; 0.5–1.5, Policy efforts are in their initial stage of development; 1.5–2.5, Policy efforts are evident and partial implementation takes place; 2.5+, Policy efforts are comprehensive and monitoring activities are systematic. The scores for individual indicators are as follows: 0, No policy instrument/mechanism exists; 1, A policy measure/s is/are under development /has/have partial or indirect impact; 2, A policy scheme/s is/are operational and implementation has started; 3, Implementation is advanced and evaluation/impact assessment is taking place. Policy measures with sector-specific or partial or non-targeted impact on a given area are subject to case-by-case evaluation. For a more detailed discussion of the IPO scoring methodology, please refer to Methodology and Process.

In accordance with the National Development Strategy “Moldova 2030”, the Government develops the innovation policy mix in coherence with the country’s socioeconomic development, reflecting the needs and challenges of its emerging innovation system. With the advancement of key economic reforms, policy efforts have focused on building a stable regulatory framework and fostering business development. In parallel, in recent years policy support has increased in several innovation domains; this support includes adopting dedicated schemes and policy initiatives related to the sub-pillars of *Knowledge absorption*, *Innovation promotion* and *Knowledge diffusion*, signalling positive development in forming an enabling environment for innovation (figure IV.1). That said, SME support measures and innovation incentives tend to be developed in independent processes, which is reflected in the country’s modest performance on the sub-pillars of *Relationships and linkages* and *Research and education*.

The downsized innovation infrastructure, stagnating industry-science linkages and a mismatch between educational outputs and job-relevant skills all require greater policy attention, and overreliance on donor support reduces the sustainability of existing measures. Developing efficient policy tools in these domains could not only bring about the improvements needed for future development and the growth of entrepreneurship but also offset barriers to innovation posed by the structural problems of the Moldovan economy, which include low productivity in SMEs and remittance-driven growth. To position and promote the country as an attractive destination for investment in RDI and technology, further policy efforts need to address integrating the business sector into the national innovation system.

Table IV.1 Overview of sub-pillars and indicators for innovation policy tools

Sub-pillar I: Knowledge Absorption	Sub-pillar II: Innovation Promotion	Sub-pillar III: Relationships and Linkages	Sub-pillar IV: Knowledge Diffusion	Sub-pillar V: Research and Education
Promotion of public and private sector organizational and managerial practices	Business plan and start-up competitions	Innovation voucher schemes	Information and brokerage schemes for technology upgrading	Policies to increase the number of science, technology, engineering and mathematics graduates
Schemes to support the development of technical and business services	R&D loans	Cooperative R&D grants	Standards, testing and certification instruments for SMEs	Policies to foster research development
Fiscal incentives for acquiring knowledge capital	VAT exemptions	Supplier matching services	Industrial technology assistance programmes and extension services for SMEs	
	Technology incubators	S&T parks	Public procurement for innovation	
		Innovation spaces	Digitalization	
		Technology accelerators		
		Business networks and clusters		
		Academia-industry linkages		
		Diaspora networks		
		Gender equality		

Source: UNECE.

Sub-pillar I: Knowledge absorption

The process of assimilating external knowledge plays a substantial role in developing dynamic core competencies, as well as in gaining competitive advantage and creating value chains.

Promotion of public and private sector organizational and managerial practices

A decade ago, no initiatives promoting organizational and managerial practices existed in the Republic of Moldova. Today, several training programmes are in place to expand the absorptive capacities of businesses and public organizations. Although a full-fledged national scheme does not yet exist, civil servants in management positions can now take part in short-term training courses at the Academy of Public Administration. The Civil Servants Training Programme 2016–2020, developed by the State Chancellery, aims to improve leadership skills and knowledge of foreign languages. In the private sector, training in entrepreneurial skills and organizational effectiveness occurs through the business management programmes implemented by the Organization for Small and Medium-sized Entrepreneurship (ODIMM), as well as through the cross-border training modules of the Chamber of Commerce and Industry.

Schemes to support development of technical and business services

Moldovan technical and business service providers primarily receive support indirectly, through international projects that grant SMEs non-reimbursable financial support for technical and business development, knowledge transfer and the like (table IV.2). For instance, the World Bank Competitiveness Enhancing Project encourages investment in value added activities and export-oriented processes by co-financing grants, and projects funded by the United States Agency for International Development (USAID) UK Aid and the Government of Sweden to promote a diverse and export-oriented economy award grants and technical assistance in the key sectors of agriculture, ICT, wine and light industry. The SME support agency ODIMM regularly updates its online register of private providers of technical and business services in the country.

Table IV.2 Donor-funded initiatives for developing technical and business services

Support measure	Funding body	Intervention area	Budget	Duration
Advice for Small Businesses	EBRD	Market for consulting services and competitiveness of SMEs	unknown	2005–present
Competitiveness Enhancing Project (co-financing grants subcomponent)	World Bank	Encouragement of investment in value added activities and export-oriented processes	\$3 million	2015–2019
ICT Excellence Center Project/Tekwill	USAID Government of Sweden	Educational, training and entrepreneurship development activities	\$8.9 million	2015–2022

Table IV.2

**Donor-funded initiatives for developing technical and business services
(Concluded)**

Support measure	Funding body	Intervention area	Budget	Duration
Moldova Competitiveness Project	USAID UK Aid Government of Sweden	Improvements in productivity and the sector-enabling environment in ICT, specialized agricultural products, tourism and textiles	\$28.5 million	2015–2021
Regional Farmer to Farmer Programme	USAID	Improvements in food processing, production and marketing	\$1.3 million	2018–2021
Supporting Entrepreneurial Education in Eastern Europe	USAID	Building soft skills and stimulating more entrepreneurial activity	\$179,102	2017–2020

Source: UNECE.

Fiscal incentives for acquiring knowledge capital

The Republic of Moldova provides fiscal stimulation in the country's seven free economic zones and the IT sector, consisting primarily of tax exemptions for resident companies and their employees. Specifically, the IT Park grants residents a 7 per cent single tax from sales revenue in lieu of income tax on entrepreneurial activity, income tax on wages and compulsory social insurance contributions; compulsory medical insurance payment; local taxes; real estate tax and road usage tax. Established in 2018, the park plays an important role in stimulating the IT sector through its preferential tax regime and cluster facilitation model. Among the success factors in its positive effects on export and local sales growth are its applied virtual approach, its reduction of bureaucratic barriers through optimizing processes (such as an IT visa programme), and its operational capacity in eight types of business activity.

Sub-pillar I

IPO evaluation and recommendations

Achievements

- ✓ A dedicated SME development agency (ODIMM) supports businesses through programmes and services aimed at strengthening entrepreneurship and competitiveness.
- ✓ Fiscal incentives applied in the IT sector have created a favourable business environment and stimulated demand for new technologies and sectoral growth.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Policy tools do not sufficiently promote good organizational and managerial practices in the public sector. 	<ul style="list-style-type: none"> ✓ Increase the effectiveness of training schemes that aim to raise the professional qualifications of civil servants, through a comprehensive analysis of the assessment framework of such plans. 	Medium-term	State Chancellery
	<ul style="list-style-type: none"> ✓ Develop criteria and requirements for established training plans and processes. 		

Sub-pillar I IPO evaluation and recommendations (Concluded)

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The development of technical and business services relies heavily on international donor support, as the economy lacks sustainable providers of services that match market needs. 	<ul style="list-style-type: none"> Conduct regular analyses of the market for technical and business services to ensure that services provided correctly respond to current demand, identifying the needs of firms. 	Medium-term	ODIMM
	<ul style="list-style-type: none"> Integrate targeted technical and business services in agendas directed at other policy areas (such as rural development and green technologies). 		
	<ul style="list-style-type: none"> Provide basic public technical and business services that do not compete with private sector offerings. 	Medium-term	MEI ODIMM
	<ul style="list-style-type: none"> Introduce quality assurance mechanisms (such as certification) for technical and business service providers, to build public confidence and stimulate the provision of high-quality service. 	Short-term	MEI

Source: UNECE.

Sub-pillar II: Innovation promotion

Promoting innovation requires governments to invest in establishing platforms where young companies can develop and test innovative ideas.

Business plan and start-up competitions

Business plan competitions are vital for stimulating the SME sector, which accounted for 31 per cent of GDP in 2016.¹ A wide variety of business plan and start-up competitions are implemented jointly and independently by state agencies, private companies, international organizations and non-governmental organizations; some include an innovation component. The Moldova State University organizes an innovative business start-up fair. Until 2018, State programmes were organized by the former Agency for Innovation and Technology Transfer, which merged into the NARD in 2018. The NARD needs to evaluate the current competitions to identify which ones to implement in the future.

Support for RDI investment

Both the Government and regional mechanisms support investment in RDI. The National Programme for Research and Innovation for 2020–2023 includes provisions concerning State funding of RDI (Republic of Moldova, 2019). Although for 2020 the programme allocates 40 per cent of such funding (MDL 256.3 million) to institutional strengthening, the NARD awards the other 60 per cent competitively through State science grants for individual and collaborative research, including support programmes for young researchers. In 2016, the European Investment Bank Group initiated the InnovFin programme to support innovation in the region, with the cooperation of the European Investment Fund.

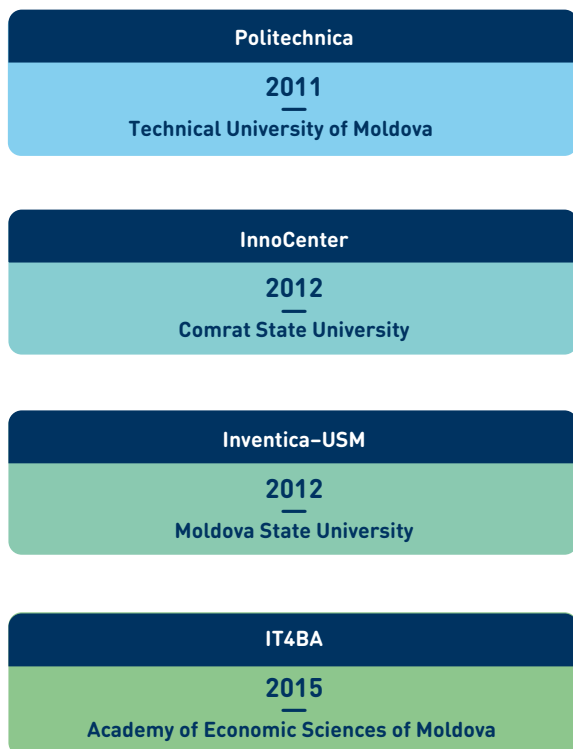
Under the Horizon 2020 programme, commercial banks distribute loans, guarantees and equity-type funding for innovative firms. Costs arising from innovating are not offset for businesses by the Government through preferential subsidies or loans, a factor that discourages innovation and investment in the domestic market. Exemptions from value added tax (VAT) exist but could be applied more widely to stimulate investment in RDI and demand for innovation.

Technology incubators and accelerators

The ecosystem supporting start-ups in the Republic of Moldova is still developing, with only a few acceleration service providers in place to respond to the needs of the growing tech community. Although no specific policy framework defines technology accelerators, similar elements are applied through technology transfer centres under the EU-funded Tempus project, the Technology Transfer Network.² Several acceleration programmes with established international connections support start-ups, mainly at the pre-seed and seed stages, including the Founder Institute Programme implemented by the DreamUps Innovation Campus and the Rockstart Launchtrack programme organized with the support of USAID and the Swedish International Development Cooperation Agency within the Moldova ICT Excellence Centre Project. Few domestic accelerators exist, so Moldovan start-ups using the services of foreign accelerators face the challenge of relocating to the host country after receiving seed capital.

The Government supports innovation incubators, most located at the premises of universities and research institutes, through the public budget. Although 10 incubation facilities opened during 2007–2018, more than half were cancelled without receiving applications (Stratan, Novac and Maier, 2018a). Four now offer solutions to students and researchers looking to commercialize their results. They aim to create a knowledge-sharing environment, providing space and support to entrepreneurs for realizing their innovative business ideas (figure IV.2) (Maier, 2013). A recent study by the National Institute of Economic Research argues that although the four operational structures offer a certain range of incubation services, they fail to make a strong impact on developing the SME sector, because of either their specialization or their lack of efficient management and innovation specialists (Stratan, Novac and Maier, 2018b).

Figure IV.2 • Innovation incubators



Source: NARD (2020).

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ A wide range of business plan and start-up competitions supports the growing start-up movement and fosters innovative entrepreneurship.
- ✓ The State Programme for Innovation and Technology Transfer, administered by the NARD, stimulates RDI and provides incentives for businesses and public R&D institutions to collaborate.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Incubator infrastructure is limited as a result of fluctuations in the number of residents, which suggests inefficiencies in service provision and insufficient capacity for innovation and technology transfer. 	<ul style="list-style-type: none"> ✓ Expand the portfolio of the innovation incubators to add value and increase their overall efficiency, by including services at several stages: pre-incubation (training, orientation, business plan assessment), incubation (for example, IPRs, legal and administrative support, fundraising, networking) and services for SMEs (for example, business diagnostics, marketing, internationalization, clustering). 	Medium-term	NARD MECR
<ul style="list-style-type: none"> • Policies do not sufficiently stimulate the production and consumption of innovative goods, and no indirect policy tools (such as tax exemptions) target innovative activities. 	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the tax policy framework to identify potential benefits of targeted taxation tools to stimulate innovation (for example, a cost-benefit analysis of VAT concessions on innovative products given exclusively to businesses with turnover below a set SME exemption threshold). 	Medium-term	Ministry of Finance
<ul style="list-style-type: none"> • Low access to finance discourages entrepreneurs from realizing innovative ideas or forces them to fund projects through traditional bank loans with unfavourable rates. 	<ul style="list-style-type: none"> ✓ Introduce direct financial support tools to facilitate access to finance for innovative enterprises (for example, preferential R&D loans, loan guarantees and/or subsidies, including loans targeted at businesses that partner with public R&D institutions to stimulate industry-science linkages). 	Medium-term	MEI MECR

Source: UNECE.

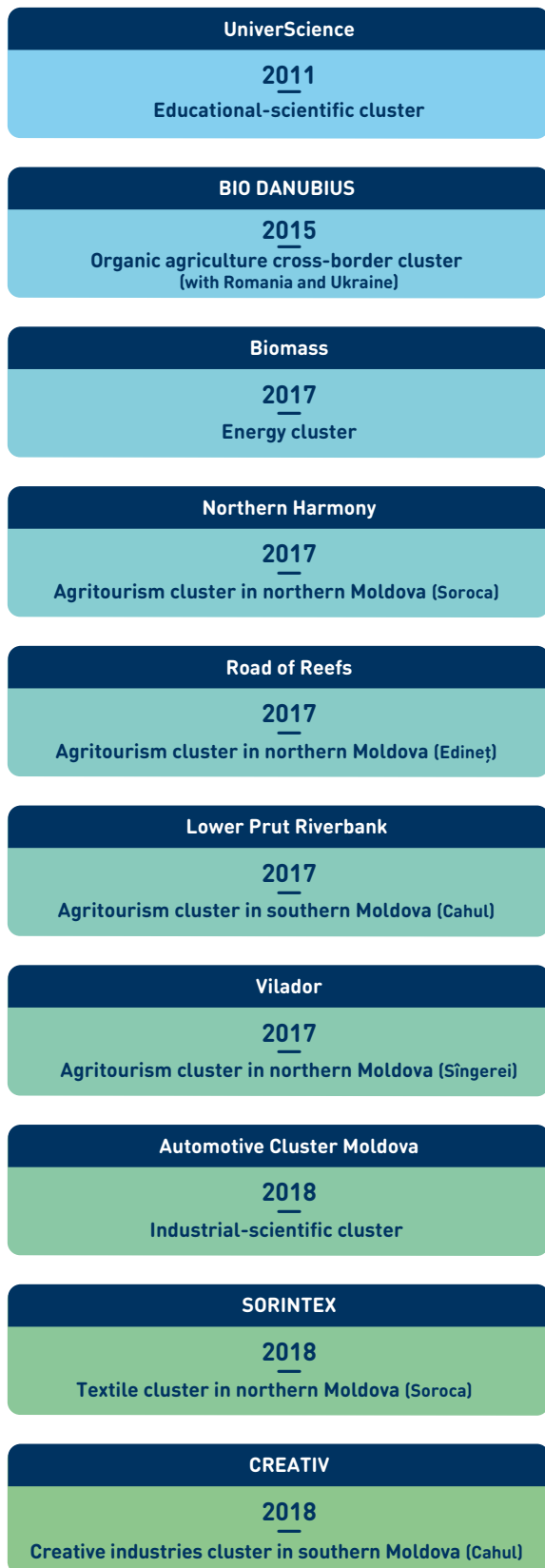
Sub-pillar III: Relationships and linkages

Schemes that promote linkages between science and industries help create innovative ecosystems by assisting scientists and businesspeople in commercializing research, creating products and developing organizational processes.

Business networks and clusters

Business networks in the country are supported by associations and chambers of commerce, uniting international and local companies. Such structures benefit local SMEs by helping them develop in-house knowledge and expertise but also by creating links between foreign and Moldovan businesspeople. A large share of Moldovan companies create innovative solutions jointly with their suppliers (28 per cent) and business partners (26 per cent), according to a study by the National Bureau of Statistics in 2016.³

Figure IV.3 • Cluster initiatives



Source: NARD (2020), EaP Plus (2017), Roman (2017).

Clusters are another efficient tool for increasing the competitiveness and innovation capacity of Moldovan SMEs while stimulating the attraction of foreign investment and technological transfer. In line with the State concept of cluster development in the industrial sector, eight cluster initiatives now exist, including recently emerged ones in the agribusiness, textile and creative industries (figure IV.3) (Republic of Moldova, 2013). For instance, the Automotive Cluster Moldova, established in 2018, unites 32 companies, universities and local public authorities. It plans to establish a technology transfer centre in Chisinau and develop local suppliers in the automotive sector, with the aim of internationalizing Moldovan companies and integrating them in global and regional value chains.

Innovation support infrastructure

The new legal framework on science and technology parks adopted in 2018 (Republic of Moldova, 2018a) granted rights to establish innovation infrastructure facilities to public entities and associations as well as to clusters. Of the three parks created under the 2007 law, only Academica remains operational, administered by the State-owned enterprise Aseteh. Since its establishment, Academica has hosted more than 40 residents in fields including renewable energy, biotechnologies, IT and environmental protection. To increase interest in the park, it should expand its value added services, such as the increased provision of business and technical training. Doing so would also avoid competing with private innovation spaces that share similar features, such as providing co-working space, organizing events (such as hackathons and start-up weekends) and mentoring.

Academia-industry collaboration and mobility

The Republic of Moldova does not have national industry-research networks, and limited mobility between industry and academia poses a challenge for Moldovan research. As an active member of the Enterprise Europe Network (EEN), the NARD is able to draw on the expertise of international networks for the domestic market. To create structured interactions and sustainable cooperation in the field, the MECR

plans to introduce an industrial doctoral programme. In addition, the National Road Map for Integration of the Republic of Moldova into the European Research Area for 2019–2021 envisions an open labour market for researchers. Among other aims, it targets the removal of legal barriers to researcher mobility and the promotion of the EURAXESS Programme, managed by the EC, which provides services to support researchers in Europe (Republic of Moldova, 2018b). Although the country does not have a dedicated scheme for encouraging researcher evaluation between academia and industry, some institutions, such as the Moldova State University, conduct annual evaluations of research personnel. A database on industry-science collaboration could help identify which measures are most needed to further stimulate the growth of business-academia networks and linkages.

Among continuing schemes the NARD inherited from the Agency for Innovation and Technology Transfer are cooperative R&D-type grants through the State Programme for Innovation and Technology Transfer, which aims to commercialize innovative ideas and results on the domestic market. Although the principal applicants are registered businesses, the programme conditions funding on 50 per cent co-financing from a partnership with an R&D institution, thereby ensuring collaboration between Moldovan entrepreneurs and researchers.

Diaspora networks

The national Diaspora Relations Bureau implements programmes that draw on diaspora networks. One of these programmes is the Diaspora Engagement Hub, a thematic grant programme designed for Moldovan citizens living abroad. It supports initiatives through two funding lines: one encouraging the transfer of human capital through grants for returning professionals and one financing diaspora specialists who are implementing innovative projects that entail technology transfer and use international best practices (Republic of Moldova, Diaspora Relations Bureau, 2020).

Gender equality

In line with the Strategy for Ensuring Equality between Men and Women in the Republic of Moldova for 2017 to 2021, the Government and international partners have implemented several initiatives on gender equality in recent years. They include ODIMM's Women in Business Programme, the European PLATO training network for female entrepreneurs, and Women in Politics, run by UN Women jointly with the United Nations Development Programme. Combining work and family life continues to be difficult for women, as reflected in the significant differences in employment rates between men and women who have at least one preschool child. Limited access to childcare and occupational discrimination remain among the main barriers to integrating women into the Moldovan labour market.

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ The rate of cluster creation has increased in recent years, attracting foreign investment and inducing technological transfer (for example, in an automotive cluster).
- ✓ The State Programme for Innovation and Technology Transfer administered by the NARD stimulates innovation and provides incentives for collaboration between businesses and public R&D institutions.
 - ✓ Several policy initiatives make use of diaspora networks, including an innovation project competition and a remittance-based investment programme.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Limited synergies between business and science impede research commercialization; business-academia collaboration is not sufficiently supported through joint projects or structured interactions and sustainable partnerships. 	<ul style="list-style-type: none"> ✓ Adopt a set of policy measures to stimulate industry-science mobility in line with set commitments (such as sabbatical leaves for professors, joint training programmes, opportunities for doctoral and master's students to pursue research projects in a company as part of their study). 	Medium-term	MECR
	<ul style="list-style-type: none"> ✓ Expand the mix of policies supporting industry-science linkages to include matching services, through which researchers with highly innovative projects can find potential partners. 		NARD
	<ul style="list-style-type: none"> ✓ Develop further the technology transfer system to strengthen linkages between public research institutions and enterprises on the domestic market. 		MECR
<ul style="list-style-type: none"> • Elements of the innovation infrastructure do not sufficiently stimulate demand, providing only limited activities and services for developing resident firms. 	<ul style="list-style-type: none"> ✓ Run a comprehensive evaluation of the innovation infrastructure, and set up an action plan for generally improving the efficiency of its elements, including replacing physical equipment, attracting highly skilled personnel, introducing value added services in the portfolio of science and technology parks (for example, hard and soft technology transfer, access to R&D facilities); creating linkages with local HEIs; outlining key performance measures; and developing a monitoring framework. 	Short-term	NARD
<ul style="list-style-type: none"> • Although several national projects have been implemented, gender equality issues persist, pointing to the need to integrate the principle more thoroughly into the policymaking process. 	<ul style="list-style-type: none"> ✓ Integrate gender-based analysis in the policymaking process to identify the gender dynamics and implications of any planned action, including legislation, policies and programmes. 	Short-term	All ministries

Source: UNECE.

Sub-pillar IV: Knowledge diffusion

Mechanisms that ensure equal and widespread access to information are vital to creating an innovative ecosystem in both the public and the private sector, serving as channels for the distribution and intersectoral flow of information.

Standards, testing and certification

Since the endorsement of the Association Agreement with the EU in 2014, the Moldovan quality assessment system has continuously been harmonized with EU standards, with actions undertaken to develop and consolidate its elements. Overseeing the implementation process, the National Institute of Standardization elaborated a strategy for the years 2018–2020 with yearly action plans and support measures in place, such as a web-based library with standards for SMEs (Institutul de Standardizare din Moldova, 2018; 2020). Standardization in the country still faces challenges, including insufficient laboratory equipment to evaluate all necessary parameters, lack of human resources and costs associated with adopting standards for companies. An EU-funded technical assistance project further supports the quality infrastructure framework in the DCFTA context, assisting exporters with numerous technical issues related to assessing conformity and to licensing (EU4Business, 2017).

Digitalization and e-governance

In line with the National Strategy for Development of the Information Society, called Digital Moldova 2020, the Broadband Development Programme for 2018–2020 sets out measures to develop new-generation electronic communications networks with national coverage. Reducing the rural-urban divide is among the programme's objectives, and connecting all localities with broadband networks has already provided access to broadband Internet for 49 per cent of Moldovan households. Increasing connectivity, however, remains a challenge in some regions. To improve access to data, the e-Government Agency has implemented more than 40 digital transformation projects since 2011, including launching a public services portal and an open data platform that offers citizens and businesses access to public data sets, ensuring transparency and open communication.

Other policy tools

In line with the sub-regional trend, policy tools in use in the Republic of Moldova do not sufficiently address the present gaps in knowledge diffusion by leveraging the potentials of industrial technology assistance, public procurement and brokerage schemes for upgrading technology. Nonetheless, they do provide indirect support in industrial technology assistance, such as the World Bank's Second Competitiveness Enhancement Project, which supports business development services to foster competitiveness in SMEs.

Sub-pillar IV IPO evaluation and recommendations

Achievements

- ✓ An e-government public service portal and an open data platform offer a vast range of digital services to businesses and individuals.
- ✓ A series of actions developed and consolidated elements of the Moldovan conformity assessment system (such as certification and international standards).

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • No separate procurement procedure for innovation exists, despite its potential to stimulate competition in the technology market and complement other R&D investments. 	<ul style="list-style-type: none"> ✓ Adopt a pre-commercial procurement approach to stimulate RDI activity through demand and to allow innovative solutions to reach the domestic market. 	Medium-term	Public Procurement Agency
<ul style="list-style-type: none"> • Outsourcing standardization because of the lack of laboratory equipment often involves expensive procedures abroad, which might fuel the rise of non-compliant products on the market; human resources trained in conformity assessment are limited. 	<ul style="list-style-type: none"> ✓ Comprehensively evaluate laboratory equipment for standardization and identify potential improvements. 	Medium-term	National Institute of Standardization
	<ul style="list-style-type: none"> ✓ Set up a maintenance and support framework. 		
	<ul style="list-style-type: none"> ✓ Promote expertise in standardization by including standards as a subject in the curricula of universities and research centres (or as an extracurricular activity). 		
<ul style="list-style-type: none"> • Brokerage services are not readily available to help innovative firms plan and implement innovation activities, and technology extension services for SMEs rely too much on donor support. 	<ul style="list-style-type: none"> ✓ Integrate brokerage and technology extension services within the service portfolio of science and technology parks and innovation incubators (such as export and market development, investment promotion). 	Short-term	NARD MECR

Source: UNECE.

Sub-pillar V: research and education

Recognizing the requirements of today's labour markets and rapidly evolving technological environment, governments have pursued a multidisciplinary approach to education through STEM initiatives. Policy measures to enhance research aim to promote research excellence, collaboration and commercialization.

Policies to increase the number of STEM graduates

Science, technology, engineering and mathematics (STEM) education has been integrated in the general education curriculum, having received support and stimulation through several policies in recent years. Each year, the MECR organizes a national science and engineering competition, engaging primary school pupils in STEM-related fields. In addition, the USAID-funded Moldova Competitiveness Project promotes STEM education through its flagship initiatives Future Classroom Lab and Educational Robotics, which benefited more than 11,500 Moldovan students during 2015–2018. Under the project, a Concept of STEM Education was further developed in 2016 in cooperation with the MECR.⁴ In response to the higher demand for STEM teachers in general education, the National Centre for Digital Innovation in Education was inaugurated in 2019 at the State Pedagogical University, with a State budget allocation of \$280,000, to train teachers in using digital technologies. Demand for STEM disciplines at universities is, however, still low, reflected in unfilled budgetary places in engineering and sciences.

Policies to foster R&D

The NARD implements RDI policy in accordance with the National Programme for Research and Innovation 2020–2023, conducting innovation projects and distributing budget allocations for R&D on a competitive basis. Its five priority areas for scientific research are health care; sustainable agriculture, food security and safety; environment and climate change; social challenges; and economic competitiveness and innovative technologies. The NARD's project competitions aim to achieve scientific results and commercialization in these priority areas (Republic of Moldova, NARD, 2020). The State Programme for Innovation and Technology Transfer is the main policy instrument that stimulates partnerships between industry and science. In the business sector, however, these provisional support measures do not translate into increased investment in R&D. In 2017, business enterprises accounted for 19 per cent of R&D expenditure, a share that has remained stable over the preceding decade (UNESCO, 2020).

By joining Horizon 2020, the EU Framework Programme for Research and Innovation, in 2014 the Republic of Moldova made a strong effort to raise the level of internationalization of its national research and innovation system, ensuring a stable process of integration in the European Research Area. The National Road Map for Integration in the European Research Area outlines specific actions and support measures for six priorities, among them a more effective national research system, optimal transnational cooperation and competition, and an open labour market for researchers. In addition, it sustains

cross-border cooperation through joint projects with foreign research organizations. The MECR supports the annual development of bilateral projects with Belarus, France, Germany, Italy, Romania and the Russian Federation. The NARD also issues calls for proposals for research projects in joint competitions with Belarus and Turkey.

Sub-pillar V IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ The Government has successfully implemented several STEM initiatives in general education since 2015 (such as national competitions, classroom labs and a national centre for digital innovation in education). ✓ Participation in several EU projects and joint bilateral programmes has enhanced cross-border research cooperation, making progress towards the country's integration into the European Research Area. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The Government needs to strengthen the stimulation of STEM in higher education, to tackle stagnating enrolment rates in related disciplines and the shortage of STEM specialists on the domestic labour market. 	<ul style="list-style-type: none"> ✓ Develop a STEM learning ecosystem in a community setting to enhance the transfer of knowledge and the development of creative and collaborative skills (for example, afterschool and/or summer STEM programmes); a web-based STEM portal, to provide information on opportunities and support infrastructure; and a STEM teaching network, to offer knowledge exchange through conferences, events and virtual discussions on strategies and lessons for improving teaching and learning. 	Short-term	MECR
	<ul style="list-style-type: none"> ✓ Use international best practices and foreign partnerships to incorporate global STEM education policies into the higher-education system, to improve educational output and equip students with knowledge and skills that meet labour market needs. 	Medium-term	
<ul style="list-style-type: none"> • Despite policy efforts to enhance research, the commercialization of science and technology activity remains low; the number of researchers is decreasing, fuelled by emigration and weak industry-science linkages, thus reducing the pool of entrepreneurial talent in the country. 	<ul style="list-style-type: none"> ✓ Conduct a comprehensive impact assessment of the research initiatives and grant programmes to identify potential inefficiencies and drivers of innovative development. 	Short-term	NARD
	<ul style="list-style-type: none"> ✓ Expand the career-funding instruments (such as excellence and mobility grants, and professional fellowships) allocated to students to stimulate pursuit of a career in research and improve the mobility of researchers between industry and academia. 	Medium-term	MECR

Source: UNECE.

Notes

- ¹ Republic of Moldova, National Bureau of Statistics, Innovation activity of enterprises in the Republic of Moldova, in the years 2015–2016, 18 January 2018.
- ² State Agency on Intellectual Property, Tempus Project “Technological Transfer Network - TecTNet” – First Year Review, 30 January 2015.
- ³ Republic of Moldova, National Bureau of Statistics, Innovation activity of enterprises in the Republic of Moldova, in the years 2015–2016, 18 January 2018.
- ⁴ Republic of Moldova, Ministry of Education, Culture and Research, Learning the exact sciences will become more attractive to students, 13 October 2016.

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Chapter IV

PILLAR III: INNOVATION POLICY PROCESSES

Pillar III examines the underlying processes for innovation policymaking: how data, evidence and stakeholder input inform how decisions are made, put into practice, monitored and evaluated, on the basis of the experience from one specific policy. Ten detailed policy indicators address each step in the policy process of that specific policy, from problem identification or market failure to policy design, implementation, evaluation, impact assessment and learning.

In consultation with Moldova's MECR and the ODIMM, UNECE selected the 2016 Law on Small and Medium-Sized Enterprises for assessment, on the basis of these criteria:

- i) The policy measure is intended to foster science, technology and innovation (STI) in the country.*
- ii) The policy measure reflects the standard innovation policy practices in the country.*

Pillar III also derives broader policy lessons for innovation policymaking.

Innovation policy processes – strengths and weaknesses

In a country such as the Republic of Moldova where 98 per cent of all companies are SMEs, the adoption of the SME Law is an important milestone. In replacing an obsolete law from 2006, the country established a sound legal framework as well as State support measures for creating and developing SMEs. The new law emerged from a structured and open, albeit lengthy, consultation process with relevant stakeholders, and its design and content are sound, responding to the needs identified in the 2012–2010 SME Strategy. The law's application is advanced, except for areas where cooperation with other line ministries is required, such as in stimulating RDI. Its main shortcomings lie in its lack of systematic mechanisms for monitoring and evaluation.

At the broader policymaking level, the IPO analysis found that the recently established regulatory impact assessments (RIAs) on draft policies follow a number of international good practices and are a promising tool to improve the quality of legislative and

regulatory flow, although questions remain about its sustainability and the ability of parliamentarians to circumvent the procedure. Mechanisms for public-private consultations, and for inter- and intraministerial consultation are embedded in a well-defined legal framework but are not systematically implemented and overseen. Monitoring and evaluation of policies remains the largest gap in the policymaking cycle, with little evidence of such practices being applied systematically even to important strategic documents and laws. These issues affect the quality of policies and hence the innovation performance of the country.

Policy overall: progress and gaps

Over the past two decades, political tensions between pro-Western and pro-Russian factions in the Republic of Moldova have created a difficult environment to govern in. State capture has been common, and the effects of the 2014 banking scandal continue to reverberate.

Although the Government has adopted substantive legislative reforms, political commitment to implementing the reforms has been limited (Rahman, 2017). European integration has anchored the Government's policy reform since 2014, when the Association Agreement and the DCFTA were signed. Recent governments have made public administration reform a priority, but the Public Administration Reform Strategy for 2016–2020 has seen only modest efforts at implementation and produced only modest impacts to date.¹

Policy focus: SME Laws

An SME law sets requirements on enterprises up to a certain size, establishing the legal framework and functioning framework for such enterprises. The objective is to make improvements by changing the behaviour of SMEs in a way that generates positive results in terms of solving societal and economic issues or challenges (OECD, 2010) and to improve the framework conditions that SMEs operate in.

Not many middle-income countries have laws specific to SMEs. Typically, they exist in economies with particularly high shares of SMEs, such as the Republic of Moldova. Alternatively, or in tandem, governments need to ensure that relevant laws that affect businesses (such as those related to competition or employment) recognize the needs of SMEs.

The foci of SME laws depend on the needs of the country and the state of its SME policy, ranging from defining what qualifies as an SME and integrating this definition across key policy documents and strategies, outlining future State support measures for SMEs, and even promoting entrepreneurs from minority groups.

International experience reflects several key features that make SME laws successful. The SME Law of the Republic of Moldova is benchmarked against these features:

- They should be founded on the dynamics observed in the private and public sectors and prepared on the basis of data-driven evidence, the identification of market failures, future scenarios and strengths-weaknesses-opportunities-threats assessments.
- Oversight and enforcement of national SME laws is often conducted by the relevant line ministry with the support of the SME implementation and funding agencies.

- SME laws should clearly identify the types of enterprises in need for support.
- They should avoid generating an excessive burden for the state's finances, especially in countries like the Republic of Moldova, where the fiscal space is very limited.
- SME laws usually prioritize incentives and promotion over direct subsidies.
- To ensure accountability and measure their outputs and outcomes, evaluation rules and tools should be incorporated in an SME law's application.

The SME Law – formally the Law on Small and Medium-Sized Enterprises – was adopted by the Parliament on 21 July 2016. It establishes the legal framework for the activity of micro, small and medium-sized enterprises, as well as the State support measures for their creation and development. It replaced an SME law from 2006 that was widely regarded as inadequate.

The law aims to promote the sustainable development of micro and SMEs by improving the legal framework and the economic environment within which they are created and function. It also aims to ensure and improve the competitiveness and performance of micro and SMEs, as well as to enable them to adjust promptly to economic and technological changes.

Table V.1 Overview of sub-pillars and indicators for innovation policy processes

Sub-pillar I: Preparation	Sub-pillar II: Design	Sub-pillar III: Implementation	Sub-pillar IV: Post-implementation
Innovation foresight	Planning	Amendment of policies	Ex-post evaluation
Rationale	Decision-making	Review of the policy against its action plan	Adaptation
	Private sector consultation		
	Coherence		

Source: UNECE.

Sub-pillar I: Preparation

Sound preparation of policies sets the foundation for the policymaking process. Public intervention should, where appropriate, depend on the identification of market failures and future trends that will affect the area of intervention.

Innovation foresight

Like most of the EESC countries, the Republic of Moldova does not systematically or continuously integrate innovation foresight – the practice of capturing future trends and perspectives related to research activities to incorporate them in innovation policies –

into the process of making innovation policy or other kinds of policy. Foresight tends to be ad hoc and restricted in scope, tied to specific policy design efforts and not subject to continuous revision. In preparing the SME Law, for instance, the MEI used no foresight tools or methods. This state of affairs means that policymakers may not ground policies, strategies and measures in agreed, realistic assumptions from which key performance indicators follow, and thus that it may not be possible to monitor and evaluate policy impacts in a concerted way.

Policy rationale

The MEI drafted the SME Law in order to adjust the Moldovan legal framework to European principles, classifications and practices for developing the SME sector. The project began in 2010–2011. In September 2012 the Government adopted the Strategy for the Development of the SME Sector for 2012–2020. One of the priorities was to adjust the legal and regulatory framework to the needs of SMEs, with the aim of reducing administrative barriers and regulatory costs for them. The SME Law therefore directly responds to the needs identified in the strategy and the shortcomings in the 2006 law.

While elaborating the SME Law, the MEI benefited from external expertise provided by the European Commission, within the project “Support for the implementation of the Agreements between the Republic of Moldova and the European Union”, which focused on assessing the 2006 law and providing input for the new law. In 2011 the German Economic Team (funded by the German Federal Ministry for Economic Affairs and Energy and implemented by the consulting firm Berlin Economics), which advises the Government on economic policy, analysed the draft law and provided recommendations. The OECD also provided inputs. In a 2013 report on competitiveness and private sector development, it examined market failures for SMEs in the country and identified international good practices for developing SME policy, practices that the MEI integrated into the SME Law. During this time the MEI conducted a review, concluding that more than 60 per cent of the old law would need to be modified; under Moldovan legislation, this required elaborating a new law.

Broader policy issues

The Moldovan legal framework of government places the responsibility for preparing policy within ministries (SIGMA, 2015). The two main line ministries dealing with STI policies are the MECR and the MEI.

Although the ministries develop evidence-based policy by assessing impacts, in general, the quality of the assessments has not been consistent, as the analysis has been weak (SIGMA, 2015). The application of RIAs by line ministries has been mandatory since 2008; however, initially RIAs were restricted to business regulation that involved economic agents. They also were limited in scope, producing explanatory notes that describe the regulation’s objective without analysing the rationale and clarifying expected outcomes. Furthermore, with no oversight unit and insufficient political backing, their application was sporadic.

In 2017, Law 100 on Normative Acts established a more comprehensive cost-benefit methodology for two RIAs: one for business regulations and one for institutional reforms

and laws that have an impact on the public budget. In 2019, with the support of the World Bank, these two RIAs were streamlined into a single methodology, fine-tuned further and approved through Government Decision No. 23. An RIA manual clearly defines quality frameworks and proportionality principles apply; that is, depending on the comprehensiveness of the regulation or law, a full-fledged quantitative cost-benefit analysis may not be required. This lightens the analytical burden for line ministries.

The RIA process is now overseen by a dedicated, World Bank–financed RIA Secretariat, operating under the State Chancellery and staffed with one expert per line ministry. It manages three working groups, one for each type of law or regulation (business, institutional, budget), which scrutinize each RIA and provide an opinion on it. Each working group has a clearly defined operational manual, which includes details on membership, meeting frequency, rules on the accountability of meetings, voting rules and so on. The working group for regulation of business activity, for example, is chaired by the Deputy State Secretary of the State Chancellery and composed of 10 representatives from ministries and agencies and 10 representatives from business associations. World Bank experts also regularly sit on the working group as observers to ensure compliance with the working group’s manual. Working groups discuss draft RIAs and vote on their suitability. If RIAs do not meet the required quality standards, they are returned to the line ministry for improvement.

RIA training across ministries has begun under a project implemented by DAI and financed by the United Kingdom. In 2019, the project trained 103 civil servants, and in 2020 it organized awareness-raising seminars for state secretaries and heads of departments. In addition, a compulsory module on RIA is being introduced into the introductory course for civil servants at their academy. According to the RIA Secretariat, the working group for regulation of business activity has scrutinized about 70 per cent of business regulations published in the government gazette. In 2017, the rate of compliance among relevant government bodies with carrying out RIAs was about 45 per cent.

Overall, the RIA process is a promising step towards better-quality, evidence-based policymaking, as it follows a number of international good practices (OECD, 2019):

- An oversight unit with sufficient competences and political backing provides clear RIA guidelines.
- Resources invested in RIA are targeted.
- Civil servants receive training.
- The rate of compliance by ministries is improving.

Nevertheless, the analysis noted two important caveats:

1. The RIA process is entirely donor assisted and funded. The World Bank plans to discontinue its assistance and funding as of 2021. The State Chancellery is likely to take over the funding of the RIA Secretariat’s staff, although at significantly lower salary levels. Thus, it is questionable whether current staff will stay involved. After donors withdraw their assistance and supervision, the risk of political capture of the working groups may increase.

2. As in Ukraine, ministries regularly adopt a practice whereby they submit draft legislative proposals for parliamentary adoption directly through individual members of Parliament. Law 100 obligates any author of a law (including a parliamentarian) to conduct an RIA before a law can be adopted. Instead, however, parliamentarians have insisted on following the parliamentary code, in which they are obliged only to enclose an explanatory note, which has no concrete guidelines attached to it and is often filled out rudimentarily and arbitrarily.

Sub-pillar I IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ The SME Law responds to legislative needs identified in the SME Strategy, which were based on assessment of the previous law and some market failure analysis. ✓ The RIA process aligns with a number of international good practices. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Ministries have not yet integrated innovation foresight practices into innovation policymaking. 	<ul style="list-style-type: none"> ✓ Integrate innovation foresight practices into the policy process of relevant line ministries to capture future trends and perspectives for research activities that are subsequently incorporated in or adjusted in a long-term strategic direction of innovation development. 	Medium-term	MECR MEI
	<ul style="list-style-type: none"> ✓ Follow up on this exercise for reviews and updates of the SME Law. 		
<ul style="list-style-type: none"> • The RIA process depends extensively on donor assistance and funding and may not be sustainable in the medium term. 	<ul style="list-style-type: none"> ✓ Secure funding for the RIA Secretariat staff beyond the end of World Bank assistance. 	Short-term	State Chancellery
	<ul style="list-style-type: none"> ✓ Continue transferring expertise and coordination functions to the line ministries and RIA working groups. 		
<ul style="list-style-type: none"> • Ministries submit draft legislative proposals directly to individual members of Parliament, circumventing the RIA process. 	<ul style="list-style-type: none"> ✓ Standardize the explanatory note that accompanies legislative acts submitted by parliamentarians to include some aspects of objectives, rationale and expected outcomes, as a short-term step. 	Short-term/ Medium-term	Secretariat of the Parliament
	<ul style="list-style-type: none"> ✓ Amend the parliamentary code to make RIAs compulsory for all legislative proposals, including those submitted by parliamentarians, as a medium-term step. 		

Source: UNECE.

Sub-pillar II: Design

Public-private consultations are an integral part of the policy design process, to ensure a policy is relevant to the market and private sector needs and to confirm that stakeholders are committed to implementing it. Innovation policy is a supplementary component of a country's overarching strategy that helps achieve the broader vision and objectives of socioeconomic development. Its priorities and activities should be consistent and coherent with other relevant policies.

Planning

The consultation process for the Moldovan SME Law evolved through multiple rounds over several months with inputs from stakeholders representing the public sector, business, academia, and trade and investment support institutions. The framework of the consultations was the Working Group of the State Commission for Regulating the Entrepreneurial Activity, which seems to be a well-functioning forum to debate in detail all policies related to the business sector.² At the request of non-governmental institutions, the MEI organized additional public sessions that were attended by non-governmental organizations and representatives of the business sector.

Public-private consultation

Ministries cannot submit policy drafts for approval until the pertinent working group issues a positive opinion. In the working group on business activity, if the private sector representatives consider that the legislative proposal will have predominantly negative impacts on the private sector, the group votes against the proposal and returns it to the authoring ministry for review and modification. This occurred on several occasions with the SME Law. According to one working group member, some 70 per cent of the documents examined are returned for changes to respond to the objections of the private sector representatives in the working group. This can prolong the policymaking process when the stakes are high (as was the case with the SME Law), but as a result business associations are actively developing advocacy campaigns in order to promote their proposals on draft laws.

Along with the consultations in the working group, the ministry solicited public consultations by posting the draft of the SME Law on a web page for 15 days. The State Chancellery website published the agenda of the meeting to approve the law. In addition, a summary of the steps of the design process for the law was made available on the Parliament's website³ before the law's adoption.

Comments and discussion from both the working group and the public consultations were taken on board to improve the law. For example, the Chamber of Trade and Industry, on behalf of its members, proposed introducing the term "young entrepreneur", and it appears in the final version of the law. Summary records were kept of both consultation

processes, and a table of proposals containing all opinions received and the MEI's responses to them was attached to the draft law when the ministry submitted it to the Government.

Overall, stakeholders interviewed for the IPO agreed that the law achieved its goal of establishing the legal framework for micro and SMEs, as well as the State support measures for their creation and development. They agreed that the consultations were open and meaningful, if lengthy. They noted that because the law was elaborated over several months, with the involvement of relevant stakeholders, the authors could tailor the initial draft more closely to the needs of the SME community.

Broader policy issues

According to Article 8 of the Law on Public Administration, government bodies must inform stakeholders about draft laws and ensure transparency in their decision-making activity by involving the private sector and civil society in the elaboration of laws. In practice, public-private dialogue is still in the development phase. The several platforms for dialogue include the Economic Council to the Prime Minister and working groups created by line ministries.

Government bodies carry out public consultations by directly contacting stakeholders, by establishing working groups and by consulting online (at www.particip.gov.md or the website of the relevant government body). Draft regulations are published for comments for a specified period (a minimum of 15 days, unless the decision is adopted under emergency circumstances) with contact information. The initiating public body must examine the recommendations received, compile an overview of the results of the process (including the proposals submitted and the body's conclusions) and make it available to the public. In practice, this last step is done by making the summary tables part of the package submitted to the Government, as was the case with the SME Law.

Yet, the amount of interaction with and involvement of the business sector is not always at the level of the working group for business activity. This may in part be explained by the frequent changes in government and thus priorities. Nonetheless, evidence suggests that business associations are gaining a stronger voice. The larger ones, such as the European Business Association and the American Chamber of Commerce, have good advocacy and lobbying strategies and are able to push topics onto the governmental agenda.

Policy coherence

Regarding interministerial coordination, before submitting a draft law for approval by the Moldovan Government, the authoring ministry must coordinate with other ministries "affected by the matter" (Law 64). Those ministries must present their opinions of the draft within 10 working days of receiving it – an ambitious time frame, especially for more complex documents such as the SME Law. The draft submitted to the Government must contain a table of all opinions received and the responses from the authoring ministry. This requirement is regularly met, as was the case with the SME Law. In case of unresolved issues between ministries, working groups can be assembled by the Prime Minister or Deputy Prime Minister; however, according to the information available, such bodies have not been set up. An official forum for conflict resolution between ministries at the administrative level is also missing (SIGMA, 2015).

Regarding intraministerial consultation, no such practices have been set up across all ministries. Some line ministries have adopted internal regulations prescribing the steps of the policy design process, but others have not (SIGMA, 2015). Ministerial decrees define the responsibilities of the departments that are directly subordinate to the minister or deputy minister in charge of a policy area (SIGMA, 2015), but the analysis found no evidence of systematic policy design training for civil servants in the ministries responsible for STI policies.

Sub-pillar II IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ Legal framework for public-private dialogue on draft policies in place. ✓ Open, comprehensive and meaningful stakeholder consultations occurred during the design of the SME Law. <ul style="list-style-type: none"> ✓ Through advocacy and lobbying strategies, business associations have a growing voice. <ul style="list-style-type: none"> ✓ A legal framework for interministerial consultation is in place. ✓ Ministerial decrees stipulate the responsibilities of ministerial departments. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Line ministries do not always meet legal requirements for public-private consultation. 	<ul style="list-style-type: none"> ✓ Ensure that requirements for public-private consultation are met and their results are systematically submitted to the Government before adoption of a law. 	Medium-term	State Chancellery
<ul style="list-style-type: none"> • An interministerial conflict resolution forum is lacking. 	<ul style="list-style-type: none"> ✓ Establish an administrative-level coordination body with a formal mandate to ensure resolution of differences of opinion among line ministries before drafts are submitted to the State Chancellery for discussion. 	Medium-term	State Chancellery
<ul style="list-style-type: none"> • Not all ministries have adopted regulations regarding the policy design process and related intraministerial consultation. 	<ul style="list-style-type: none"> ✓ Ensure that all line ministries adopt policy design regulations to ensure that relevant departments are consulted on policy drafts. 	Medium-term	Line ministries
<ul style="list-style-type: none"> • The civil service lacks specific policy design training. 	<ul style="list-style-type: none"> ✓ Integrate policy design training modules within the curriculum for civil servants. 	Medium-term	State Chancellery
	<ul style="list-style-type: none"> ✓ Offer training-on-the-job in policy design by external consultants with international experience. 		

Source: UNECE.

Sub-pillar III: Implementation

Targets and time frames defined in the action plan provide a basis for regular reviews of implementation progress. Analysis of intermediate progress helps identify administrative, institutional and technical challenges faced during implementation and makes it possible to undertake necessary measures, including adjusting activity and reallocating resources.

Key elements of the SME Law have been implemented and enforced. The Advisory Council for SMEs has been set up and is working on its tasks of analysing the competitiveness of the SME sector, promoting the development of competences and entrepreneurial spirit, and presenting recommendations for improving the business environment. This is an important institutional addition.

An innovative and important aspect of the law relates to the availability of resources for implementing SME support policies. This aspect is the provision of an annual financial allocation amounting to 0.3 per cent of the gross value added to GDP by the SME sector in the preceding year. Furthermore, the law regulated the access of SMEs to public procurement of products, works and services, establishing a quota of 20 per cent of all public procurement contracts for subcontracting to micro and small enterprises. Another significant provision was a tax deduction for expenses linked to entrepreneurial education and continuous vocational training. More generally, the law institutionalized the allocation of responsibilities of all the actors involved in elaborating and implementing policies and programmes to support SMEs.

Broader policy issues

In areas that require cooperation with other line ministries, such as the stimulation of RDI, less progress is evident in the Republic of Moldova. In addition, Moldovan policies often lack specific performance indicators and a timeline, as well as accountability, given the absence of evaluation and impact assessments, as well as the lack of a central oversight body to monitor implementation of the SME Law. In principle, when legislation is adopted, it should define specific reporting requirements and deadlines, if the responsible ministry is reporting to the Government. After receiving reports, the State Chancellery is supposed to analyse them and send feedback. In practice, this requirement is not complied with, including during the adoption of the SME Law, which lacks reporting and monitoring requirements.

Sub-pillar III		IPO evaluation and recommendations	
Achievements			
<ul style="list-style-type: none"> ✓ The Government passed and successfully enforces the SME Law. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The SME Law does not contain any provisions for monitoring its implementation. 	<ul style="list-style-type: none"> ✓ Establish an indicator framework for monitoring key performance indicators against the targets and activities of the SME Law, to evaluate its implementation. 	Short-term	MEI
<ul style="list-style-type: none"> Cross-ministerial mechanisms have not been implemented. 	<ul style="list-style-type: none"> ✓ Use the working group on business activity to address implementation issues that concern ministries other than the MEI. 	Short-term	Line ministries
<ul style="list-style-type: none"> Line ministries do not adhere to reporting requirements. 	<ul style="list-style-type: none"> ✓ Ensure that line ministries adhere to reporting requirements and that the State Chancellery verifies reports. 	Short-term	Line ministries State Chancellery

Source: UNECE.

Sub-pillar IV: Post-implementation

Ex-post evaluation is completed after the implementation of the action plan and based on results rather than forecasts. It helps establish the impact of policy activities on the industry in general, on specific fields or on beneficiaries. In light of experience acquired during implementation, governments introduce necessary adjustments to innovation policy measures so as to better target new or established policy objectives.

Ex-post evaluation

The feedback mechanism involving the Moldovan State Chancellery was not applied to or functional in the SME Law. This omission may result from a lack of continuity related to frequent government changes and a lack of planning within the SME Law itself. Indeed, perhaps the most significant drawback of the SME Law is that it does not contain any provisions for monitoring and evaluating its impact.

One ad hoc evaluation of the SME Law has occurred, and one is under way. In 2018, the Parliamentary Commission on Economy, Budget and Finances organized a hearing on the results of implementing the SME Law. The MEI reported on progress on the enforcement of the law and members of Parliament could request further details about activities implemented.⁴ No evaluation report was produced or implementation needs defined. The application of the law is also being measured within the 2020 OECD SBA Assessment, which contains specific indicators to measure progress on the implementation of the legal framework for SMEs and scores countries on it.

Broader policy issues

Monitoring and evaluation practices are the weakest part of the policymaking cycle in the Republic of Moldova. Monitoring and evaluation practices across line ministries are insufficient, and when applied, overly output-focussed, including in government bodies responsible for STI policy. The implementation of the SME Law is not systematically monitored or evaluated, nor is its impact gauged.

To tackle this issue, the Government set up special divisions for policy analysis, monitoring and evaluation in each line ministry in 2010, as well as a corresponding division with the same title in the State Chancellery, which was supposed to coordinate divisions in the line ministry. Yet, these divisions are not operational in all ministries, some are understaffed and central oversight mechanisms to ensure implementation are insufficient. Adaptation of policies is not a widespread practice, one of the reasons being the lack of adequate personnel. Thus, few systemic linkages ensure that learning feeds into the design process for future policy. Concerning STI policies specifically, the former RDI strategies underwent no intermediate or ex-post evaluation, nor was there any evidence that lessons learned were integrated into the 2020–2023 National Programme for Research and Innovation. For a more detailed overview of the monitoring and evaluation practices of innovation policies and measures, see chapter IV.

Sub-pillar IV IPO evaluation and recommendations

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> A culture of policy evaluation is lacking, including the willingness to learn from failures and guarantee transparency. 	<ul style="list-style-type: none"> Guarantee that at least every large programme or initiative is supported by a scientific formative evaluation or ex-ante as an impact assessment. 	Mid-term	State Chancellery Various ministries
<ul style="list-style-type: none"> The SME Law lacks provisions for monitoring it and evaluating its impact. 	<ul style="list-style-type: none"> Develop appropriate capacities and mechanisms for monitoring and evaluating the application of the SME Law. 	Short-term	MEI
<ul style="list-style-type: none"> Monitoring, evaluation and impact assessment practices are scarce in policymaking. 	<ul style="list-style-type: none"> Streamline and implement impact assessment mechanisms systematically to enhance the quality of the flow and stock of laws and policies. 	Medium-term	State Chancellery
	<ul style="list-style-type: none"> Adopt legislation that makes it mandatory to report on the implementation of major laws. 		
<ul style="list-style-type: none"> The rare monitoring and evaluation practices in the Government are of poor quality . 	<ul style="list-style-type: none"> Adopt more systemic linkage of monitoring and evaluation practices to policy design, including in government bodies responsible for STI policy. 	Medium-term	State Chancellery MECR

Note: No achievements were identified for this sub-pillar.

Notes

- ¹ Transparency International Moldova, Monitoring the implementation of the public administration reform and resource distribution, Press release, 18 July 2018.
- ² The working group members are the Ministry of Finance; the Ministry of Labour, Social Protection and Family; the Ministry of Education; the Academy of Sciences of Moldova; the Institute of Economy, Finances and Statistics; the Agency for Innovation and Technology Transfer; the Public Procurement Agency; the National Bureau of Statistics; the Customs Service; the Chamber of Commerce and Industry; the Centre for Fighting Economic Crimes and Corruption; the Organization for the Development of the SME Sector; the National Confederation of Employers of the Republic of Moldova; the National Confederation of Trade Unions of Moldova; the ARIA Competitiveness and Productivity Centre; the Export Promotion Organization of Moldova; and the Small Business Association.
- ³ Republic of Moldova, Parliament, Draft law on small and medium-sized enterprises, www.parlament.md/ProcesulLegislativ/Proiectedeacteleislative/tabid/61/LegislativId/3184/language/ro-RO/Default.aspx.
- ⁴ Republic of Moldova, Parliament, Development of the Small and Medium Enterprises Sector, Hearing at the Committee on Economy, Budget and Finance, 5 August 2018.

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Website

Government of Moldova, National Development Strategies: www.particip.gov.md



UKRAINE



Chapter I

ECONOMIC OVERVIEW

General overview

Ukraine is a lower-middle-income economy in Eastern Europe, neighbouring the Republic of Moldova, Romania, Hungary, Slovakia, Belarus and the Russian Federation. The country has faced significant turmoil in recent years: the Maidan Revolution, continuous protests, political upheaval and territorial disputes. With its fertile soil and large, arable fields earning it the nickname “Breadbasket of Europe”, Ukraine is one of the continent’s largest producers of agricultural goods, such as wheat and sunflower oil and seeds (box I.1). Recently, lower prices for steel, one of its largest export products, and lower investment levels overall, both foreign and domestic, have led to a contraction in industrial output, including manufacturing. Ukraine enjoys great potential for innovation, with a well-educated labour force, a long tradition of science and technology resources, natural endowments, market access, a large and successful diaspora, and a nascent but successful ICT sector. At the same time, despite significant reform momentum over the past years, political and economic instability, corruption and the low quality of institutions and overall governance continue to constrain Ukraine’s ability to enable and promote the broad experimentation with ideas and technology – or innovation – needed for the country to put its economy on a solid, diversified and well-integrated foundation for long-term sustainable development.

Reform process

Ukraine’s political environment has been volatile since its independence from the Soviet Union in 1991. From being a rentier state under Kuchma in 1994 through the Orange Revolution in 2004, Ukraine has gradually, albeit in fits and turns, liberalized its economy. Emerging from the economic decline and sharp drop of its currency following the Maidan uprising and territorial disputes, Ukraine has struggled with numerous challenges, including a sudden and sharp drop in the value of the hryvnia, and the subsequent rise in inflation and decline in consumer spending. In addition to efforts to stabilize inflation,¹ the Government has undertaken several reforms to improve institutional transparency, ease business regulation and constrain corruption. In the World Bank’s *Doing Business* report, Ukraine’s ranking has consistently improved, climbing from 152nd among 190 economies in 2011 to 64th in 2019, but it is the lowest ranked country in the EESC sub-region (World Bank, 2020a). In other areas, however, substantial structural reforms remain that likely inhibit innovative activities in particular. They include a strong legacy of inefficient SOEs, subsidies for which constituted

Box I.1 The "Breadbasket of Europe"

With 33 million hectares of arable land, Ukraine has great potential to drive economic growth through its large agriculture sector. It leads the world in producing sunflower oil and seeds. In 2019, its agricultural exports to the EU trailed only those of the United States and Brazil. In 2020, its annual exports of wheat, barley and corn grew by 34 per cent. Yet productivity is constrained: value added was just \$440 per hectare in 2018, compared with \$1,100 in Poland and \$2,450 in France. Despite ongoing reform efforts, land property rights need to be further improved. To fully exploit the country's potential, innovation is essential. In addition to greater efficiency in production processes, the sector requires greater access to finance for smaller landowners and improved legislation that makes policies transparent and efficient, prevents monopolization and improves monitoring of the land market.

Source: World Bank (2019c); Emerging Europe, Ukraine: The breadbasket of Europe, 13 January 2020; Food and Agriculture Organization, Support to investment: Reviving Ukraine's breadbasket, 14 May 2018.

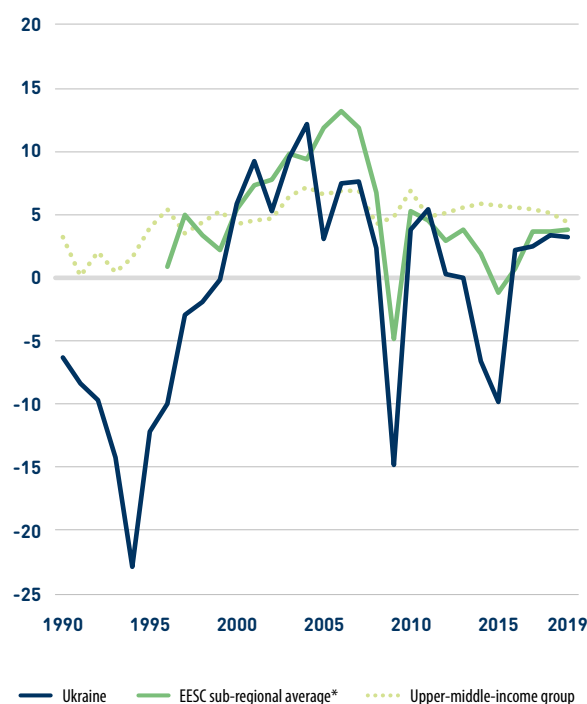
as much as 8.5 per cent of GDP in 2014 – both direct and indirect (IMF, 2016), as well as low levels of market competition, a private sector with low absorption capacities, insufficient protection of intellectual capital and investors, and cumbersome legacy regulations of product and labour markets.

GDP growth

GDP growth in Ukraine has been highly volatile over the past 30 years. After substantial economic decline following independence, Ukraine clocked up higher, albeit volatile, rates of growth in the years leading up to the 2008 global financial crisis. The subsequent rebound in growth was interrupted by the Crimean crisis, leading to a GDP growth rate of almost – 10 per cent in 2015 (World Bank, 2020b). Since 2016, however, growth has again turned positive, although below the average for the lower-middle-income group (figure I.1). GDP per capita (in current US dollars) grew from \$2,125 in 2015 to \$3,660 in 2019, while GDP per capita based on purchasing power parity in current international U.S. dollars increased from \$10,164 (in 2015) to \$13,341 (in 2019). In 2019, GDP growth reached 3.2 per cent, driven by growth in household consumption; an increase in real wages, production and exports in the agriculture sector; and a significant amounts of remittances.

Stagnating reform efforts, lack of investment and structural inefficiencies continue to inhibit productivity. Furthermore, gross capital formation in 2019 amounted to 12.6 per cent of GDP, more than

Figure I.1 • Annual GDP growth, 1990–2019 (Per cent)



Source: UNECE, based on data from the World Bank (2020b).

*Values missing for Belarus, Armenia and Azerbaijan for 1990, and the Republic of Moldova for 1990–1995.

15 per cent lower than the average for the lower-middle-income group. Remittances have grown in importance, from 5.5 per cent of GDP in 2014 to 10.4 per cent in 2019 – the fourth highest in the sub-region but slightly above the EESC average (9.2 per cent). This trend has improved the welfare of Ukrainian households by stimulating consumption, but outmigration has also reduced the supply of labour on the domestic market (Pierkowski, 2020).

Government spending has risen recently, to 20.8 per cent of GDP in 2018 from 18.6 per cent in 2016, but fell below 20 per cent in 2019. An increase in social spending will be necessary to mitigate the negative effects of pandemic-related restrictions, such as the decline in both consumption and the commodity prices on which the country is reliant for exports (World Bank, 2020c). The current account deficit was at –0.86 per cent of GDP in 2019. Ukrainian banks reported a non-performing loan (NPL) ratio of 48.4 per cent of gross loans in 2019² – 75 per cent of that accounted for by State-owned banks such as PrivatBank (with 45 per cent of NPLs). The majority of NPLs resulted from the expansion of credit before the 2014 crisis, mainly due to low solvency assessment standards, insufficient protection of lenders' rights and related-party lending, while the resulting financial instability was then further amplified by the crisis as several State-owned banks were unable to service their debts and defaulted³ (IMF, 2016; NBU, 2018). Although the National Bank of Ukraine (NBU) has made efforts to reduce the high ratio of NPLs and improve macroeconomic stability (EBRD, 2019), the systemic misallocation of capital towards State-owned banks and SOEs continues to constrain the banking sector, while cronyism and anticompetitive practices inhibit the growth of the private sector (World Bank, 2018).

Foreign direct investment

Foreign direct investment (FDI) inflows in Ukraine decreased substantially after the financial crisis of 2008 and fell even more significantly between 2012 and 2014. In 2016, following the Crimean crisis, inflows recovered to 3.6 per cent of GDP, but in 2019 they declined to almost 2 per cent of GDP, the second lowest share of FDI in the EESC sub-region (World Bank, 2020b). Foreign investment is mostly market- and resource-seeking, given the country's agricultural strength, energy resources and geographic positioning – the bulk of FDI inflows go to mining, real estate, electricity and gas, finance and ICT (UNCTAD, 2020). Nonetheless, efficiency-seeking investment in high value added and export-oriented industries, such as manufacturing, is inhibited by the country's political instability, slow reform process and macroeconomic vulnerability (World Bank, 2018).

Sectoral decomposition

The focus on commodities with low levels of sophistication, the low levels of productivity and the lack of competitiveness due to the dominance of SOEs, especially in the industrial sector, impedes Ukraine's economic growth. Services have constituted 50–55 per cent of GDP since 2008 and employed about 60 per cent of the labour force between 2015 and 2019. Further growth of the sector's value added is impeded by restrictive regulations. Industry (including construction, manufacturing and mining) more recently has

contracted due to declining steel prices,⁴ accounting for 22–23 per cent of GDP between 2013 and 2019 and more than 24 per cent of employment in 2019 (World Bank, 2020b), while manufacturing has declined slightly, from 12 per cent in 2016 to 10.8 per cent in 2019. Specifically, the focus on more traditional industries, such as machine-building and steel and chemical production, and the lack of technological modernization (OECD, 2015) inhibits the industrial productivity of the economy. Agriculture represented 9 per cent of GDP in 2019 and employed 14.5 per cent of the labour force. Despite the large quantities of arable land and a sustained tradition of capital-intensive, productive agriculture, several factors hamper the growth of productivity in the agriculture sector: constraints and inefficiencies in the investment climate, especially in property rights, and the lack of protection of small landowners (World Bank, 2019a; 2019d).

Demographics

Low fertility rates along with outmigration driven by domestic instability and the dearth of good employment opportunities have led to a slow but consistent decline in population, in particular the working-age population. Over the past two decades, the population has declined at rates between –0.2 and –1 per cent annually. Outmigration, although lower in 2019 than in 2018, remains higher than the number recorded in 2014⁵ (Ukrstat, 2020). The main destination of emigrants (and thus the main source of remittances) has shifted from the Russian Federation to countries of the European Union (EU), such as Poland (Pieńkowski, 2020). In 2019 the unemployment rate was 8.9 per cent (modelled estimate from the International Labour Organization (ILO)) (World Bank, 2020b). Although, on a global scale, a substantial share of Ukraine's labour force is educated, labour productivity is low, largely because of the insufficient quality of higher education, insufficient capital investment and missing institutional mechanisms (EU and ILO, 2018).

External position

Following its accession to the World Trade Organization (WTO) in 2008 and the Association Agreement with the EU, including the Deep and Comprehensive Free Trade Area, in 2014, Ukraine has slowly opened up its economy. The sum of exports and imports (as a percentage of GDP) declined from 107.8 per cent in 2015 to 99 per cent in 2018 (World Bank, 2019b). The EU (28) accounted for approximately 42 per cent of total merchandise exports in 2018; other significant trading partners were the Russian Federation (7.7 per cent), China (4.7 per cent) and Turkey (5 per cent) (WTO, 2018).

Although most of Ukraine's exports in 2018 consisted of agricultural products and metals, their level of complexity was modest. The value of 0.14 for the index of merchandise concentration of exports – in which values closer to zero signify higher diversification – indicates that Ukraine's export basket is the most diversified in the EESC sub-region, followed by those of Belarus (0.18) and the Republic of Moldova (0.19) (UNCTADstat, 2020a). Nonetheless, in 2018, seed oils (8.06 per cent), semi-finished iron (7.83 per cent), corn (6.87 per cent), wheat (6.06 per cent) and iron ore (5.64 per cent) were among the most exported products (OEC, 2020). The remaining exports were mainly machines,

chemicals, food stuffs and wood products. Similarly, most of Ukraine's revealed comparative advantages (RCAs)⁶ are in food and live animals, manufactured goods and crude materials, whereas the strongest RCAs in the three-digit group are in wheat, maize, barley, pig iron, ingots, fuelwood, aluminium and iron ore, and vegetable fats and oils (UNCTADstat, 2020b). By increasing the complexity of goods and diversifying exports, Ukraine could enhance its economic growth by shifting the focus of the economy's production structure towards the creation of a more balanced trade portfolio (CID, 2020).

In the 2020 Competitive Industrial Performance (CIP) index, Ukraine ranked 69th out of 152 economies, the second highest in the region after Belarus (47th) (UNIDO, 2020), indicating reasonable levels of industrial production. This performance is slightly distorted by the size of the economy, and on the 2019 Global Competitiveness Index, Ukraine ranked less well – 85th out of 141 economies – and would have ranked lower had it not been for its good performance on indicators such as market size and skills (WEF, 2019).

Institutional quality

The quality of governance, including the rule of law, control of corruption and institutional efficiency, is a central binding constraint on sustainable development in Ukraine. Specifically, on institutional quality assessed as an average of the World Governance Indicators (Kaufmann and Kraay, 2020) of rule of law, government effectiveness, voice and accountability, and control of corruption, Ukraine scored –0.5, lower than the regional average (–0.3). This indicates that governance in the country is weak (WEF, 2018).

Sustainable development

Although the poverty headcount ratio in Ukraine is slightly higher than 1 per cent at national poverty lines in 2019 – the lowest in the EESC sub-region (World Bank, 2020b; Ukrstat, 2020), approximately 23 per cent of the population lives below the actual subsistence income level (Ukrstat, 2020). Poverty remains a challenge for the economy, in both absolute and relative terms: substantial interregional differences persist, such as the relative levels of education in rural areas compared with urban areas.

Ukraine, like other countries in Eastern Europe and the South Caucasus (EESC), still faces systemic and institutional challenges to gender equality, deepened by the political and economic crises. This is not indicated by women's educational achievement levels: in 2014 more women (88.8 per cent gross) were enrolled in tertiary education than men (76.8 per cent) (World Bank, 2020b). Yet although the labour participation rates for both men and women have been declining since the crisis in 2014, in 2019 men still participated at higher levels than women (63 per cent versus 46.7 per cent) (modelled ILO estimate) (World Bank, 2020b) and, as elsewhere, women are particularly underrepresented among innovative entrepreneurs.

In order to ensure sustained economic growth, the Ukrainian Government should focus on improving the environmental sustainability of its activities. According to the 2019 GII, Ukraine ranks fairly low – 115th out of 129 economies – on GDP per unit of

energy use (Cornwell University, INSEAD and WIPO, 2019). The Strategy of the National Ecological Policy of Ukraine until 2020 (Ukraine MENR, 2017) noted the significant harm from environmental – air, water, and soil – pollution caused by the mining, chemical, fuel and energy industries, which is shortening life expectancy in the country. The main drivers of pollution are the economy's inherited resource- and energy-intensive industries, the unsustainable and inefficient use of resources, and the lack of environmental regulation. Improving the environmental sustainability of the economy to ensure further economic growth requires investing in innovation.

Synthesis

This table presents the main achievements and challenges for the economic development of Ukraine, based on the findings described in this chapter.

Progress made so far	Challenges ahead
<ul style="list-style-type: none"> • Enhanced ease of doing business in the past decade. • Stable economic growth due to agricultural exports; increase in household consumption and remittances. • Highly educated labour force. • Strong potential for diversification and upgrading in the production structure, such as in agriculture, engineering and professional services. 	<ul style="list-style-type: none"> • Strengthen institutional efficiency and address issues of corruption. • Diversify production structure, especially in tradeables, to build resilience and sustain macroeconomic stability, improving the competitiveness of Ukrainian products in foreign markets. • Modernize industrial production processes to stimulate labour productivity. • Attract efficiency-seeking FDI to support private sector development and enhance market competition. • Increase protection of property rights and efficiencies in the investment climate in the agriculture sector. • Reform institutional governance of SOEs by regulating the distribution of capital allocation. • Regulate energy-intensive industries to decrease their negative environmental impact and increase sustainability.

Source: UNECE.

Notes

- ¹ National Bank of Ukraine (2020), NBU's projections for 2020–2022: Inflation close to 5% and economic growth at 3.5%–4%, Inflation Report, 6 February, <https://bank.gov.ua/en/news/all/natsionalniy-bank-ochikuye-na-inflyatsiyu-blizko-5-ta-ekonomichne-zrostannya-na-rivni-35-4-u-2020-2022-rr>.
- ² National Bank of Ukraine (2020), Bank NPLs drop to three-year minimum below 50% in 2019, 10 February, <https://bank.gov.ua/en/news/all/u-2019-rotsi-chastka-nepratsyuyuchih-kreditiv-u-bankah-vpershe-za-ostanni-roki-znizilasya-nijche-50>.
- ³ National Bank of Ukraine (2020), The high non-performing loans (NPL) ratio remains a significant problem for the banking sector, <https://bank.gov.ua/en/stability/npl>.
- ⁴ World Bank, Ukraine: Recent economic developments, 2 August 2020, <https://www.worldbank.org/en/country/ukraine/overview>.
- ⁵ These values exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of temporarily occupied territories in the Donetsk and Luhansk regions (Ukrstat, 2020).
- ⁶ The revealed comparative advantage (RCA) database, created by UNCTADstat, measures trade patterns between countries based on their relative productivity. It does not take into account national trade measures, such as subsidies and (non-)tariff regulations.

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Website

United Nations, Ukraine: <http://www.un.org.ua/en/resident-coordinator-system/gender-equality>

Chapter II

INNOVATION PERFORMANCE OVERVIEW

Innovation climate

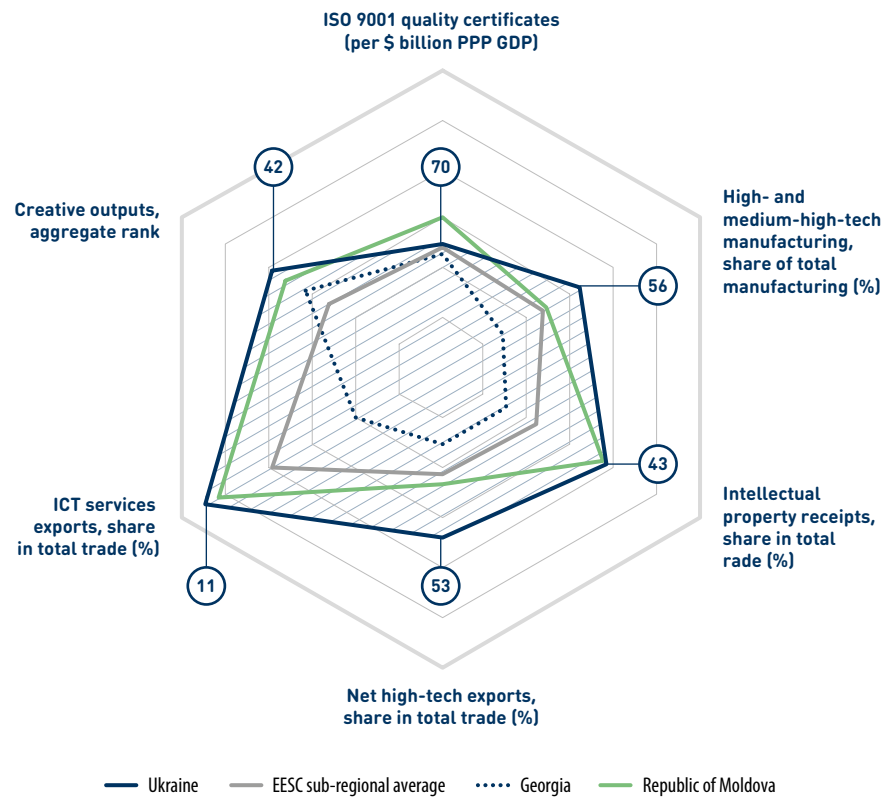
Despite socioeconomic challenges that slow progress, innovation in Ukraine is growing steadily. The country's innovative strength lies, most significantly, in its human capital. Yet regulatory and institutional restrictions stemming from the volatile political and economic environment of its recent past hinder its competitiveness and the efficient translation of these capabilities into stronger innovative performance. The business sector's low involvement in research and development (R&D), the modest share of high-tech exports and the weak ability to commercialize innovative ideas all impede the transition to a knowledge-based economy, obstructing Ukraine from efficiently and effectively capitalizing on its innovation output capacities.

Innovation outcomes

In the 2019 Global Innovation Index (GII) (Cornell University, INSEAD and WIPO, 2019), Ukraine ranked 47th out of 129 economies in terms of innovation performance. It has been classified as an innovation achiever for the past six years, exceeding expectations for its level of development. Figure II.1 on the following page depicts the country's innovation performance on selected output indicators, as ranked in the 2019 GII.

The economy performs relatively well on innovation outputs compared with the average for the EESC sub-region. For both creative outputs and intellectual property receipts, Ukraine ranks among the top 50 economies globally. Among the EESC countries, for creative outputs it ranks the highest (42nd), followed by Armenia (48th), the Republic of Moldova (49th) and Georgia (58th). Intellectual property receipts constitute 0.2 per cent of total trade, as compared with the EESC average of 0.07 per cent. Most notably, Ukraine is a global leader in exports of information and communication technology (ICT) services, making up 4.5 per cent of total trade – the highest among the EESC countries. In contrast, Ukraine's shares of high-tech and medium-high-tech manufacturing in total manufacturing (approximately 20 per cent) are low, compared with those of its peers. High-tech exports, which accounted for 8.5 per cent of total manufacturing exports in 2015, had decreased to 5.4 per cent of such exports in 2018 (World Bank, 2020). Although this share was less than that of Armenia (7 per cent), it still exceeded those of Belarus (4 per cent), Georgia (3.3 per cent), Azerbaijan (4 per cent) and the Republic of Moldova (2.5 per cent). Moreover, the number of quality certificates from the International Standards Organization (ISO)

Figure II.1 • Innovation performance by selected GII indicators, 2019 ranks



Source: Cornell University, INSEAD and WIPO (2019).
Note: Lower values indicate stronger performance.

(3.5 per \$1 billion in purchasing power parity (PPP) of GDP) showed only modest performance in technology upgrading, which is essential if Ukrainian firms are to move up in global value chains. In intellectual property types, however, the country ranks first in the number of utility models by origin (per \$1 billion PPP GDP), while maintaining leading positions in several other types, including trademarks (6th), industrial designs (8th) and patents (17th). That said, few innovative ideas are commercialized, reflecting the lack of demand for innovation on the Ukrainian market – a significant gap that needs addressing.

In collaboration with the National Statistics Agency of Ukraine (Ukrstat), the Kyiv National Economic University (KNEU) provides a wide range of indicators on firm innovation activity across regions within the country. The share of industrial enterprises that introduce innovations, whether in products and or in technological processes, was 13.8 per cent in 2019, while the volume of innovative production as a share of the total volume of realized production of goods and services of industrial enterprises was 1.3 per cent (Ukrstat, 2020).

A strength of Ukraine is the rapidly growing ICT sector (World Bank, 2019), which had an estimated value of \$4 billion in 2019 (World Bank, 2019). It holds the potential to significantly enhance productivity across all sectors. The country's rankings in the 2019 GII for ICT access (65th) and ICT service exports (11th) reflect the significant ICT capacities

it has developed in recent years (Cornell University, INSEAD and WIPO, 2019). Yet, the use of ICT in creating business models remains quite low (ranked 109/129). Furthermore, although the number of broadband subscriptions (12.8 per 100 people in 2018) is growing, it is still significantly lower than in the other EESC countries, with the exception of Armenia (11.8 per 100 in 2018) (World Bank, 2020). According to the World Bank (2019), one of the main factors inhibiting the full exploitation of the ICT sector is the lack of interlinkages with other industries in the economy.

Innovation activity – channels, strengths and weaknesses

Since 2010 the business sector has consisted almost entirely of micro and small enterprises, whose engagement in innovation is growing but remains inwardly focused. In 2017, micro enterprises made up 82.2 per cent and small enterprises 13.2 per cent of all businesses. That year, almost 70 per cent of innovations (both products and services) were developed for use by enterprises rather than for the market (KNEU, 2020). Although the number of innovative firms increased in 2018, concentrated in the regions of Kharkiv and Kyiv, the type of innovation remained mainly technological – purchase of machinery, equipment and software.

International knowledge transfer

Despite Ukraine's good capacity for generating innovative output, institutional and political instabilities still deter foreign investment and commercialization efforts. Between 2012 and 2014, FDI inflows fell from 4.6 per cent to 0.6 per cent of GDP, and although inflows managed to recover to 3.7 per cent in 2016, the trend sank again in 2018 to 1.9 per cent, the lowest share in the sub-region (World Bank, 2020). Yet high-tech imports to Ukraine constituted 8.8 per cent of GDP, the highest share among EESC countries, closely followed by those in Georgia (7.5 per cent) and the Republic of Moldova (7.4 per cent) (Cornell University, INSEAD and WIPO, 2019). Overall, the country ranked 73/129 for knowledge absorption.

In the 2019 GCI, Ukraine scored highest on the sub-indices for skills (70/100) and infrastructure (70/100) and lowest on the sub-index for innovation capabilities (40/100), the latter mainly because of a decline in R&D investment.

Investment in R&D

Overall enterprise expenditure on innovation rose during 2017–2019, especially in the regions of Dnipropetrovsk and Zaporizhia (Ukrstat, 2020). Disparities between regions underscore the need to provide more support for private sector development and engagement in innovation to improve the competitiveness of firms and build synergies between them.

The share of R&D expenditure in GDP in 2018 (0.47 per cent) was higher than the sub-regional average (0.34 per cent), surpassing Georgia (0.3 per cent) and the Republic of Moldova (0.25 per cent) but lagging behind Belarus (0.61 per cent) (World Bank, 2020).

Of greater concern is the gradual decline in the share of GDP allocated to R&D up to 2017, with only a slight increase in 2018.

According to the 2019 GII, nearly a third of R&D investment originated from abroad. Ukraine ranked 15th (out of 129 economies) in gross expenditure on R&D from abroad; at 24.4 per cent, this is not only the highest in the EESC sub-region but approximately 10 per cent higher than in Belarus (14.1 per cent) and Georgia (14.7 per cent) (Cornell University, INSEAD and WIPO, 2019). When it comes to university-industry collaboration, though, Ukraine displays moderate performance (64th) for the sub-region, scoring higher than Georgia (98th) and Armenia (89th) but lower than Azerbaijan (32nd) (Cornell University, INSEAD and WIPO, 2019).

Private domestic spending on R&D was less prevalent, with the country ranked 59th (Cornell University, INSEAD and WIPO, 2019). Using data collected by Ukrstat and provided by KNEU (2020), a breakdown of internal expenditure on R&D (Hrv 16 billion) reveals that in 2018 more than half (56.3 per cent) went to scientific and technical (experimental) development, while 22.7 per cent went to basic scientific research and 21 per cent to applied scientific research. The spending is concentrated in Kharkiv, Dnipropetrovsk and Zaporizhia (Hrv 1–3 billion each) and Kyiv (Hrv 7.5 billion), where the country's main research institutions are located; Ukraine employs approximately 988 researchers per million citizens.

International co-publications in 2013 constituted approximately 33 per cent of the country's total publication output, of which over 60 per cent concentrated in natural sciences, slightly over 20 per cent in applied sciences and almost 11 per cent in health sciences (Schuch et al., 2016).

Skills development

Educational quality is one of the core strengths of the economy, not only in comparison with sub-regional levels but also on a global scale. In the 2019 GII, the country ranked 14th in tertiary enrolment, with 83.4 per cent of the eligible population studying at that level. More impressively, it ranks 2nd in employment of women with advanced degrees (almost 30 per cent of all employed). This is also reflected in the Quacquarelli Symonds university ranking in 2019, which put Ukraine 46th out of 129 countries, indicating a strength relative to the income group. In addition, in 2019 the country performed well on three GCI dimensions – skill set of graduates (ranked 54th of 141) and ease of finding skilled employees (53rd), as well as research institution prominence (44th) – although on the dimension of state of cluster development, it ranked less favourably (96th) (WEF, 2019).

Furthermore, approximately 33 per cent of the labour force was employed in knowledge-intensive jobs in 2019. Although that share is higher than in Belarus (27 per cent), it lags the shares in the rest of the countries of the sub-region. In addition, the number of researchers as a share of employees engaged in R&D had fallen to 65 per cent in 2019, compared with almost 75 per cent in 2014 (Ukrstat, 2020).

Synthesis

This table presents the main achievements of and challenges to R&D and innovation (RDI) in Ukraine, based on the findings described in this chapter.

Progress made so far

- Relatively strong performance in technology and creative outputs.
- Significant enrolment in tertiary education, contributing to the country's large pool of talent.
- Substantial growth of the ICT sector in recent years, with high shares in total trade of ICT service and high-tech exports.
- Satisfactory performance on intellectual property revenue from abroad.

Challenges ahead

- Increase the share of high-tech and medium-high-tech goods in total manufacturing.
- Increase public and private investment in R&D, strengthen industry–science linkages and encourage technology upgrading.
- Commercialize more innovative ideas by stimulating demand in the domestic market.

Source: UNECE.

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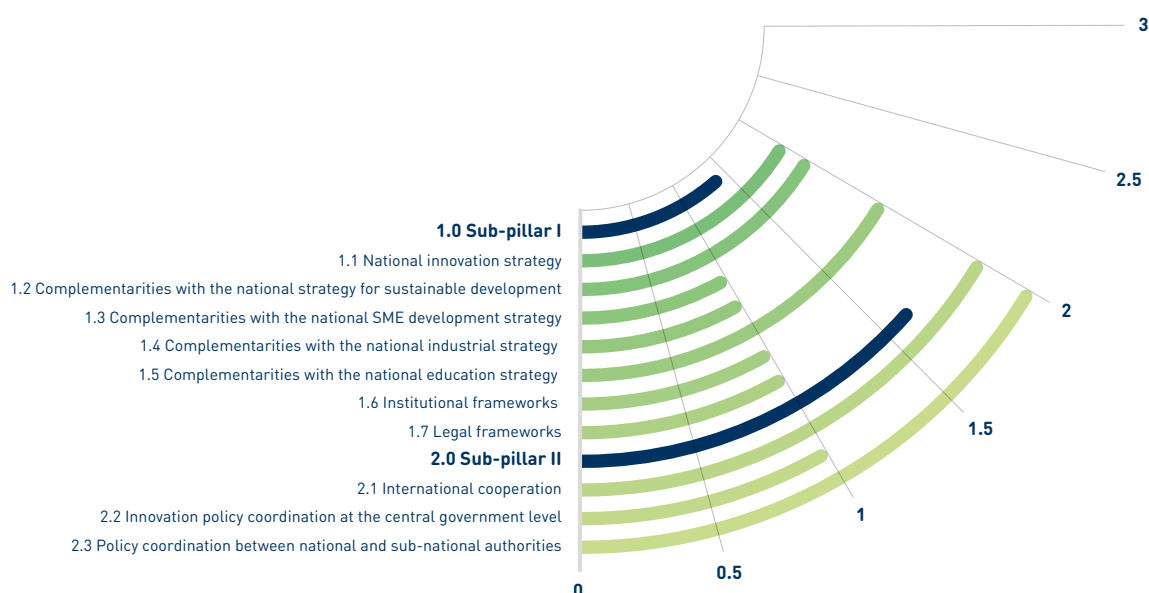
Chapter III

PILLAR I: INNOVATION POLICY GOVERNANCE

The first pillar of the IPO reviews the overarching strategic, institutional and legal framework for innovation policy, as well as the competences of and coordination among government bodies involved in innovation policy. This review assesses the extent to which innovation policy governance is sound, well-structured, efficient and flexible.

National innovation policy governance – strengths and weaknesses

Figure III.1 • Scoring of sub-pillars: innovation policy governance



Source: UNECE.

Note: Each indicator is assessed using a score from 3 to 0. The highest score (3) is given to fully fledged policy initiatives and mechanisms that can provide mutual learning opportunities for the EESC sub-region. A score of 2 is assigned if a policy initiative is operational. An indicator receives 1 point if an initiative is under development. The lowest score (0) is given if a country does not have a specific policy mechanism, strategic document or policy initiative. The indicators are based on an extensive questionnaire answered by national government agencies and external consultants. The questionnaire consists of open, binary and multiple-choice questions. Additional statistical data supplement the formal assessment framework by informing on key socioeconomic trends and context conditions. Statistical data are not directly integrated into qualitative indicators but are used to guide scoring decisions. For more information, please refer to Methodology and Process.

Ukraine faces three major barriers to developing innovation policy: (1) regulations that are inadequate, contradictory and at times poorly enforced; (2) the absence of certain institutions and (3) the rather low capabilities of policymakers to successfully formulate and implement policy initiatives. Many strategic documents related to supporting innovation are in development. Some, such as the SME Development Strategy, have been officially adopted but are not operational for lack of funding. The limited coordination among government institutions and limited alignment of related and overlapping policy areas result in a fragmented policy landscape and consequently a less effective and efficient innovation policy.

The system of science and innovation in the country is in transition. New funding instruments, innovation policy tools and strategic documents have been introduced since 2015; however, these efforts have not been systematic or well coordinated. The positive externalities of science and innovation policy initiatives have often been offset by interruptions in funding and changes in policy priorities. Government authorities responsible for science and innovation do not have the expertise, knowledge and funding required to succeed in both enforcing laws and implementing innovation support programmes. In July 2019, Ukraine adopted a national innovation strategy that defines national priorities and foresees concerted measures to accelerate development in science, technology and innovation (STI) (chapter II). In addition to proposing measures to support high-technology sectors, Ukraine has launched initiatives aimed at developing low-technology sectors and creative industries. Although the country has strong linkages with international partners, policymakers still need to learn how to leverage them to advance innovation for sustainable development.

Table III.1 Overview of sub-pillars and indicators for innovation policy governance

Sub-pillar I: Innovation Policy Frameworks	Sub-pillar II: Innovation Policy Coordination
National innovation strategy	International cooperation
Complementarities with other policy areas	Innovation policy coordination within the central government and between national and subnational authorities
Institutional frameworks	
Legal frameworks	

Source: UNECE.

Sub-pillar I: Innovation policy frameworks

Given the many government levels involved in the design and implementation of innovation policy, it is vital to have a strategic document containing the Government's overarching vision.

National innovation strategy

To enable and actively promote scientific research and the transformation of innovative ideas into commercial solutions more broadly, Ukraine developed the comprehensive National Innovation Strategy 2030, which includes an action plan. The strategy aims to address gaps in legal frameworks, improve education and fortify an entrepreneurial culture, and strengthen the national innovation infrastructure. Other objectives are to promote private R&D and boost demand for innovation. Ukraine's skilled workers and islands of research excellence have attracted foreign companies to establish about 100 R&D centres (Schuch et al., 2016). Yet the demand for innovation among domestic enterprises remains very low. With the exception of the food industry, the business sector is not actively involved in commercializing research and not yet able to become a significant force supporting research in Ukraine.

Implementing the national innovation strategy requires addressing several challenges. Ongoing structural changes in the economy may have negative effects on the demand for research outputs. Before independence, the share of the manufacturing sector in GDP was near 29 per cent; more recently, it accounted for only 6 per cent (Cheney et al., 2017). A recent shift in exports away from the Commonwealth of Independent States towards EU member states, where demand for Ukrainian R&D-intensive products is low, poses the risks of shrinking the number of innovative enterprises in Ukraine and further hindering the commercialization of domestic research. Moreover, Ukrainian companies have not fully tapped the potential of process innovations to boost their productivity and performance. Another structural problem is low competition in the domestic market and the presence of large monopolies. Stimulation of RDI activities in the private sector requires adjusting underlying market conditions and establishing policy mechanisms that support innovation.

Complementarities with other policy areas

Reforms of innovation policy in recent years paralleled overarching strategic changes in other policy areas. In 2014, the Government launched a decentralization reform that fundamentally reshaped relations between the central and subnational authorities (OECD, 2018). It made subnational authorities more prominent actors also in innovation policy. Under proposed changes in legislation, subnational government authorities will play larger roles in funding RDI activities. Using the support of the Joint Research Centre of the European Commission, Ukraine launched a national Smart Specialization Initiative in 2019, which seeks to identify competitive advantages of regions and foster research and investment in competitive areas.

In 2015, the President launched the Strategy for Sustainable Development, "Ukraine 2020", to improve socioeconomic conditions and bring the country closer to the level

of leading nations in research, innovation and favourability of business conditions. Owing to changing policy priorities, however, this strategy never became fully operational. Another strategic document that supports economic development and innovation in the private sector is the SME Development Strategy 2020. Launched in 2014, it set out three objectives for 2020: (1) an increase in the share of innovative enterprises to 20 per cent, from 14.6 per cent; (2) an increase of the share of R&D expenditures by enterprises as a share of GDP from 0.42 per cent to 0.426 per cent; and (3) improvement in the access of small and medium enterprises (SMEs) to finance. These objectives have not been completely achieved. Despite its ambitious vision, the SME Development Strategy has not become fully operational because of both government changes and limited funding.

Ukraine remains one of the few countries in Europe with a weakly developed system of innovation support. The few innovative activities in the private sector are funded by the sector itself. Other forms of capital are not easily accessible. Indirect support instruments are especially weakly developed. Access to debt financing is limited for innovative projects due to their inherent risks, with most debt finance having to be backed by collateral rather than cash flow and incurring substantial real interest rates. Some private equity firms and venture funds invest in information technology (IT) start-ups, but their participation in funding RDI is not sufficient to support the development of the national innovation ecosystem.

The State Education Strategy 2013–2022 has not been updated and is not operational. In the absence of a fully fledged education framework, educational reforms are carried out in an isolated manner. Instead education policy is shaped by two strategic documents: the Concept of State Policy on Secondary Education Reforms “New Ukrainian School” and the Concept of State Policy “Modern Vocational Education”. These policy documents are not aligned with innovation policy needs. Ukraine does not have a dedicated strategy on higher education and lifelong learning either.

The educational system does not produce enough professionals with the skills and competences demanded by business and industry. According to the Programme for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD), Ukrainian 15-year-olds show below-average results on school education in mathematics, science and reading (Schleicher, 2019). In 2018, the National Agency for Education Evaluation was established to improve education equality and align Ukraine closer with best international practices. The Government envisions several structural changes in national education. One priority is to increase the quality of education and its relevance for business sector needs. Another is to increase the socioeconomic impacts of higher education institutions (HEIs) through organizational restructuring, development of innovation infrastructure and changes in incentives. To support research commercialization, the Ministry of Education and Science (MoES) has established a position of vice rector for innovation in each HEI.

Despite the considerable number of policy mechanisms, many science and innovation policy initiatives and strategic documents are neither fully and sustainably funded, nor implemented to their full extent. The National Digital Strategy of Ukraine 2017–2020 was designed to help the IT sector develop and to promote smart manufacturing using advanced digital technologies, but has not been fully implemented because of a lack of funding and changing government priorities. In several instances, as in the case of the national space strategy, the adoption of strategies has continually been delayed.

Another challenge is the limited alignment of innovation-related strategies with science and innovation policy initiatives. The national innovation strategy is linked with sections on promoting innovation activities in the strategies for sustainable development, SME development and exports. Owing to the lack of a strategic vision and coordination mechanisms among responsible agencies, however, efforts to achieve national priorities and objectives for the growth of innovation activities are carried out in a fragmented manner. The low synergistic effects among national strategies ultimately result in a less efficient and effective innovation policy.

Institutional frameworks

Innovation policy is implemented by a variety of ministries and government agencies, with the MoES and the Academy of Sciences taking leading roles. The MoES is responsible for supporting innovation and education. The Ministry for Development of Economy, Trade and Agriculture is also active in steering and implementing the national innovation policy by strengthening frameworks for commercializing research. In 2019, the Ministry launched the Innovation Ecosystem of Ukraine project to improve funding of innovation activities in the business sector and to better support the protection of intellectual property. The Ministry of Finance also helps formulate and implement innovation policy through many initiatives, including the Ukrainian Start-up Fund and co-financing mechanisms for technology companies.

An important milestone in innovation policymaking in Ukraine was the transition of the chief role of ministries from public service providers to policy hubs. This change was enacted by the Order of the Cabinet of Ministers of Ukraine No. 1013-p in 2017. New policy directorates were introduced in ministries to improve their capabilities to formulate, design and implement policy initiatives.

The National Science Foundation, which replaced the discontinued State Fund for Fundamental Research in 2019, aims to reshape public research. With an annual budget of \$21.2 million in 2020, it awards competitive research grants, supports international research mobility and facilitates research commercialization. The Foundation has a supervisory board of domestic and foreign experts, ensuring a high quality of governance and accountability for funding decisions. It plans to launch public-private grant calls to increase the availability of funding and provide more incentives to commercialize research. The Government has also launched several other initiatives for funding innovation in the business sector, such as the Presidential Fund and the Ukrainian Start-up Fund. In 2016, the Cabinet of Ministers founded the Investment Promotion Office of Ukraine (UkraineInvest), an independent advisory body with a mandate to attract FDI to the country. It is the main organization responsible for fostering business linkages with international partners. To support contacts between academia and business, the MoES has partnered with the Enterprise Europe Network to launch the All-Ukrainian Innovation Festival.

Legal frameworks

Innovation in Ukraine is governed by a variety of legislative acts that are often not well aligned. Government authorities and institutions have rather limited capacities to effectively implement and enforce regulations on RDI and limited expertise in innovation policy.

Thus they are not always able to formulate complementary legislative acts that support the implementation of overarching policy frameworks. Restrictions on business and research activities, and excessive reporting and monitoring arrangements significantly constrain the innovative potential of firms.

Limited protection of intellectual property rights (IPRs) has negative effects on the attraction of FDI and on innovation activities in general. Government institutions with responsibilities for IPRs have overlapping mandates, leading to less efficiency in policy initiatives. As protection of IPRs is not a high priority for Government authorities, implementation of the IPR reform initiated in 2016 has been sluggish.

Although the country achieved some progress in improving its legislative base for business formation in 2016, gaps in tax and insolvency regulations continue to impede business development (chapter II). The regulatory system poses serious barriers to the development of private enterprises. A lack of legislation on spin-offs constrains the growth of companies and hinders research commercialization. Ukraine does not use public procurement as a mechanism to support innovation, although procurement policies can improve the delivery of public services and create demand for innovation. Making innovation procurement an effective tool for supporting innovation activities will require three steps: establishing an action plan to support procurement for innovation, collecting data on innovation performance and providing professional guidance to participants in the procurement process.

In addition to regulatory gaps and inconsistencies, there are some instances of overregulation and unnecessary bureaucratization of RDI. According to new regulations, institutes of the Academy of Sciences, like any public body, must get permission for purchases of any type of electronic equipment, including computer keyboards, from the Ministry of Digital Transformation. Such procedures considerably slow down research and lead to ineffective use of human and financial resources. State regulation prevents the National Academy of Sciences from leading research projects funded by the European Commission. Upon receiving funding from the EU, the Academy cannot distribute those resources among foreign partners for research purposes.

As the system of certifications and national standards has not undergone comprehensive reform, it is still largely structured to meet the needs of the pre-independence economy (Gupta and Vnukova, 2014). This considerably circumscribes the possibilities for Ukrainian enterprises to export and to tap into the opportunities of global value chains. The Government is working on aligning the national system of certifications with EU standards.

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ The Government has introduced a comprehensive national innovation strategy.
- ✓ The Government has made a strong, strategic commitment to supporting innovation.
 - ✓ Government action has managed to retain a critical mass of R&D activity.
- ✓ The country has a long-standing scientific culture and centres of research excellence.
 - ✓ Ministries now play the role of policy hubs to design and monitor policy.
- ✓ The Government has developed policy mechanisms and strategies to support innovations in low-tech industrial sectors.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The innovation strategy lacks a concerted action plan and dedicated, sustainable funding. 	✓ Develop the tools and mechanisms needed to put the strategy into practice.	Medium- to long-term	Government
	✓ Develop the first three-year action plan, with concrete objectives, milestones and budgets.		
	✓ Secure sustainable funding for these activities, allocated to the budget lines.		
	✓ Include actions to develop appropriate capacities and mechanisms for monitoring and evaluation.		
<ul style="list-style-type: none"> • Central policies and strategies lack alignment, with a tendency towards overlap, duplication and lack of clarity. 	✓ Focus the first review of the innovation strategy on a concerted analysis of complementarities, overlaps and the need for clarity, aiming both to adapt the strategy and related action plans and to mainstream innovation into related policy areas, such as SMEs, education and industrial development.	Medium-term	Government
<ul style="list-style-type: none"> • There is a lack of clear mechanisms for supervising the implementation of the innovation strategy and for the exact role of the NCUST in this context. 	✓ Review the terms of reference of the NCUST in view of international good practices with the aim of reformulating its mandate to strengthen its role as a lead coordinating body for the innovation strategy and for mainstreaming innovation across a broader range of policy areas.	Short-term	NCUST
<ul style="list-style-type: none"> • Government authorities with responsibilities for science and innovation policy are in their infancy and often lack capabilities to successfully design and implement science and innovation policy initiatives. 	✓ Conduct a needs assessment of implementing bodies to identify the capacities lacking and the means needed for the first action plan under the innovation strategy.	Short-term	MoES
<ul style="list-style-type: none"> • Alignment is lacking among pieces of and gaps in legislation, including IPRs, tax and insolvency, and spin-offs. 	✓ Conduct a gap analysis, identifying legislative gaps and overlaps with a view to the objectives in the innovation strategy.	Short-term	MoES with mandate and oversight from NCUST
<ul style="list-style-type: none"> • Overregulation and bureaucratization impede efficient implementation of the innovation strategy, including on purchasing equipment and participation in international partnerships 	✓ In parallel with the gap analysis, conduct a concerted regulatory impact assessment, in particular looking at regulatory obstacles to implementing the innovation strategy.	Short-term	MoES with mandate and oversight from NCUST

Source: UNECE.

Sub-pillar II: Innovation policy coordination

Coordinated approaches help avoid overlapping, duplicating or omitting actions required to implement innovation policy successfully.

International cooperation

The new innovation strategy recognizes international collaboration in science and innovation as a priority. Ukraine has multiple agreements with international partners to cooperate on conducting joint research projects and developing innovative solutions. In 2018, the MoES approved the Road Map on Integration of Ukraine into the European Research Area. Examples include projects of the European Organization for Nuclear Research, the EUROfusion Consortium and the European Grid Infrastructure. In 2015, Ukraine joined Horizon 2020, the EU Framework Programme for Research and Innovation. Since then, 207 Ukrainian organizations have received 150 grants worth €29.78 million in total. Given the size of the economy and the extensive network of R&D-performing organizations, this funding amount is rather low, only 0.71 per cent of the total funding available for Horizon 2020 member countries. Ukrainian organizations thus need to improve their ability to compete for international grants and improve the quality of the innovation infrastructure.

Ukraine has multiple cooperation agreements in science and innovation with a large number of international partners. Nevertheless, the level of international cooperation is below the country's potential. The Government is working on attracting FDI into domestic R&D-intensive industrial sectors and providing opportunities for knowledge spillovers from developed countries. A further aim is supporting the exchange of best practices and mutual learning among domestic and foreign enterprises. The National Export Strategy and its action plan, adopted in 2017, propose a set of measures to improve the international competitiveness of domestic firms and integrate them into global value chains.

Despite having multiple linkages with international partners, Ukrainian RDI organizations cannot fully capture all benefits from international collaboration for reasons that include a lack of incentives, demonstration effects, limited academia-industry collaboration and legislative barriers. They often do not have access to information on available funding opportunities or they have limited knowledge of and skills in how to manage application procedures. Legislation puts excessive constraints on how domestic organizations can use research grants, which negatively affects their involvement in international research and innovation projects. Domestic stakeholders such as the National Academy of Sciences often lack sufficient funding to shape international collaboration in science and innovation or at least to be perceived as equal partners.

Innovation policy coordination at the central government level and between national and subnational authorities

The Law on Innovation Activity of 2002 envisions a central government body responsible for coordinating national science and innovation policy initiatives. Although the MoES has

been the main contributor to coordinating science and innovation policy, the Ministry for Development of Economy, Trade and Agriculture has also played a role in recent years, as has the Ministry of Finance. The Innovation Development Council, established as a temporary advisory body by the Cabinet of Ministers, was founded to help formulate and design innovation policy initiatives. It is not functional and has a very limited impact on policy alignment efforts.

To harmonize implementation policy, Ukraine established the National Council on Science and Technology Development (NCUST) under the Cabinet of Ministers (chapter II). The council, which is chaired by the Prime Minister, gathers once every three months to discuss high-level issues of innovation policy. Its decisions directly affect the implementation of the innovation strategy. The Council has two subordinate bodies: an administrative committee responsible for organizational issues and a scientific committee responsible for providing analytical support. The scientific committee consists of 24 members who mainly represent research organizations. Each month committee members gather to discuss a broad array of issues related to scientific and technological development. Policy proposals of the scientific committee are submitted to the NCUST and are coordinated with the executive committee and the Parliament.

Yet, coordination efforts by the central government are still in their infancy and require more systematic and frequent interactions among innovation policy stakeholders. There are cases of overlaps of functions and unclear mandates of government authorities. For example, the recently established Ministry of Digital Transformation needs to have a clear mandate for its role in the national science and innovation policy.

Coordination between national and subnational authorities in science and innovation is shaped by the national innovation strategy. It calls for identifying priorities by region, based on the smart specialization initiative. Ukraine's regional governments develop their own regional innovation strategies and incorporate the national innovation policy priorities into them. The role of regional innovation agencies is filled by not-for-profit organizations and business associations, such as the Agency of European Innovations in the L'viv region.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ Ukraine has strong historic linkages with foreign partners in science and innovation fields.
- ✓ Substantial progress has been made in decentralizing authority to regional and municipal governments, including innovation promotion.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The remaining substantial barriers to international cooperation in science and innovation and to recent reforms need to be addressed in a concerted fashion. 	<ul style="list-style-type: none"> ✓ Systematically identify the leading regulatory, legislative and informational constraints on international cooperation, using the low uptake of Horizon 2020 instruments as an example. 	Short-term	MoES
	<ul style="list-style-type: none"> ✓ Strengthen the capabilities of research organizations and HEIs to raise international funding. 		

Sub-pillar II IPO evaluation and recommendations (Concluded)

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> Innovation policy is often carried out ad hoc, with little efficient coordination, unclear and overlapping mandates, and no long-term sustainable funding. 	<ul style="list-style-type: none"> Review and clarify the mandate, terms of reference and distinction among central, high-level coordination bodies such as the NCUST. 	Medium-term	Government
	<ul style="list-style-type: none"> Clarify the roles of all bodies with regard to the innovation strategy, especially new bodies such as the Ministry for Digital Transformation. 		
<ul style="list-style-type: none"> Policies and institutions do not efficiently address regional disparities, inefficiencies and opportunities for innovative development. 	<ul style="list-style-type: none"> Review the decentralization initiative to create clear roles and responsibilities for promoting innovation in Ukraine's regions, within the framework of the innovation strategy. 	Short- to medium-term	Regional governments with participation by national government
	<ul style="list-style-type: none"> Build on the momentum of the smart specialization initiative to create mechanisms for developing regional science and innovation policy initiatives. 		

Source: UNECE.

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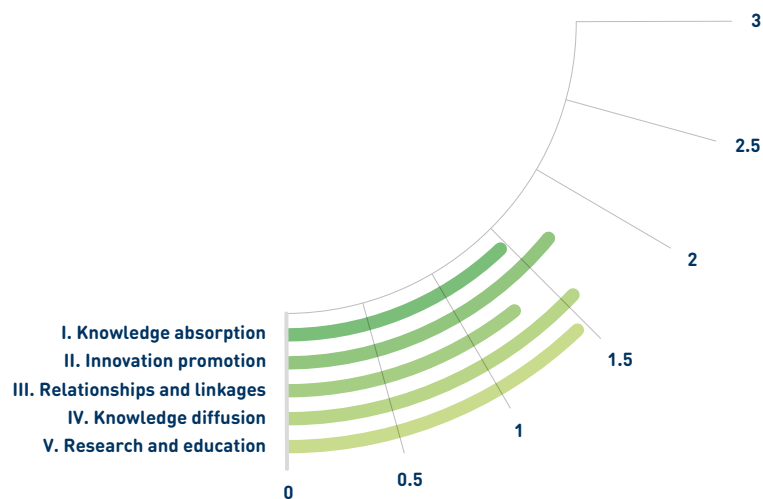
Chapter IV

PILLAR II: INNOVATION POLICY TOOLS

This chapter reviews the policy mechanisms in Ukraine that enable, promote and diffuse innovation. It addresses five sub-pillars: knowledge absorption, innovation promotion, relationships and linkages, knowledge diffusion, and research and education.

National innovation policy mix – strengths and weaknesses

Figure IV.1 • Scoring of sub-pillars: innovation policy tools



Source: UNECE.

Notes: The IPO pillar scoring is calculated on the basis of the average quantitative assessment of individual indicators under each sub-pillar. In the evaluation, all support measures in a given area are taken into account and special consideration is paid to indirect contributions from external mechanisms. The overall band score for each sub-pillar forms the following generalized categories: 0.0–0.5, No policy instruments/mechanisms exist; 0.5–1.5, Policy efforts are in their initial stage of development; 1.5–2.5, Policy efforts are evident and partial implementation takes place; 2.5+, Policy efforts are comprehensive and monitoring activities are systematic. The scores for individual indicators are as follows: 0, No policy instrument/mechanism exists; 1, A policy measure/s is/are under development/has/have partial or indirect impact; 2, A policy scheme/s is/are operational and implementation has started; 3, Implementation is advanced and evaluation/impact assessment is taking place. Policy measures with sector-specific or partial or non-targeted impact on a given area are subject to case-by-case evaluation. For a more detailed discussion on the IPO scoring methodology, please refer to Methodology and Process.

Ukraine's Innovation Development Strategy 2030 aims to promote innovation to further sustainable development in the country. In the face of the stark economic challenges facing the country, it is especially important that the Government apply effective measures that correctly identify market needs. The IPO analysis of policy measures identified competitive advantages in Ukraine in the sub-pillars of *Knowledge absorption* and *Innovation promotion*, as well as several areas that need improvement in the sub-pillars of *Relationships and linkages*, *Knowledge diffusion*, and *Research and education* (figure IV.1). Human capital remains the central input to innovative development in Ukraine, but policy tools have yet to optimize the quality and relevance of human capital relative to the needs of the labour market. Despite the tangible improvements in the enabling environment noted in chapter II, the analysis points to a mismatch between targets specified in innovation policy documents and the scope and efficiency of vertical measures in place. Having effective tools and procedures to monitor and evaluate results and make impacts in line with the objectives of the innovation strategy will be central to ensuring good use of scarce public resources. A set of tailored policy recommendations has been developed to address those issues and is described in this chapter.

Table IV.1 Overview of sub-pillars and indicators for innovation policy tools

Sub-pillar I: Knowledge Absorption	Sub-pillar II: Innovation Promotion	Sub-pillar III: Relationships and Linkages	Sub-pillar IV: Knowledge Diffusion	Sub-pillar V: Research and Education
Promotion of public and private sector organizational and managerial practices	Business plan and start-up competitions	Innovation voucher schemes	Information and brokerage schemes for technology upgrading	Policies to increase the number of science, technology, engineering and mathematics graduates
Schemes to support the development of technical and business services	R&D loans	Cooperative R&D grants	Standards, testing and certification instruments for SMEs	Policies to foster research development
Fiscal incentives for acquiring knowledge capital	VAT exemptions	Supplier matching services	Industrial technology assistance programmes and extension services for SMEs	
	Technology incubators	S&T parks	Public procurement for innovation	
		Innovation spaces	Digitalization	
		Technology accelerators		
		Business networks and clusters		
		Academia-industry linkages		
		Diaspora networks		
		Gender equality		

Source: UNECE.

Sub-pillar I: Knowledge absorption

The process of assimilating external knowledge plays a substantial role in developing dynamic core competencies, as well as in acquiring competitive advantage and creating new value chains.

Promotion of public and private sector organizational and managerial practices

A constraint on innovative development in Ukraine is the level of knowledge absorption, signified by low productivity that limits the ability of the private sector to generate high demand for R&D and innovative input (see chapter II). The strong correlation between quality of management and labour productivity in the EECS sub-region was first identified in BEEPS V, the Business Environment and Enterprise Performance Survey of the European Bank for Reconstruction and Development (EBRD, 2020),¹ in which Ukraine scored low on both indicators. It is thus essential to improve the professional skills and competences of local entrepreneurs, as outlined in the Export Strategy 2017–2020 (Ukraine, 2017). In addition to donor-funded projects on business development services and quality assurance mechanisms (such as certification by the International Standards Organization (ISO)), private sector organizational practices are enhanced by the Export Promotion Office (EPO), which has supported exporting firms through education activities, training and consultancy services since its establishment in 2016 (ISO, 2020). In the public sector, specialized training centres of the National Academy for Civil Service (NACS) enhance the professional qualifications of State officials, in line with the NACS Strategic Action Plan 2019–2022 (Ukraine, 2014a). In 2018, the NACS spent 54 per cent of its State budget allocation on training in public governance. This policy support does not extend to R&D institutions or State-owned enterprises (SOEs).

Schemes to support development of technical and business services

The innovation infrastructure in Ukraine provides consulting, marketing and financial services, as well as technical support, thereby contributing to the growth and competitiveness of enterprises. The SME Development Office (SMEDO), established in 2018, coordinates the provision of technical and business services, while the EPO provides a one-stop portal offering a range of services to SMEs, including training and seminars on developing business and attracting investment, as well as information sessions on how to launch a business (SMEDO 2020). Nevertheless, most support in the area comes through donor-funded projects. For example, the EBRD-EU4Business initiative established business support centres in 15 regions of the country in 2016–2020. Public-private collaboration is therefore essential to draw on international experience and benefit from the value chains established by the private consulting firms to which technical and business services are continuously outsourced.

Fiscal incentives for knowledge capital

The 2002 Law on Innovation Activity (Ukraine, 2002) stipulates favourable tax policy for innovation and technology transfer; however, the Government has not yet implemented fiscal incentives for innovation. The tax system, established in 2014, was simplified in an amendment in 2018 with approved criteria for State aid in selected areas, including scientific research, technology development and innovation activity (Ukraine, 2014b).² Included in the Tax Code of Ukraine from 2011 (last amended in 2019) are several innovation-related exemptions from value added tax, such as for software products and imported equipment. Yet the exemptions are of limited scope, failing to support many potential opportunities to invest in innovative goods and services. Furthermore, no sector-specific assessment of tax policies has yet been conducted, leaving the cost-benefit ratio of introducing additional fiscal incentives in growing fields (such as the IT sector) unknown.

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ A specialized SME agency – the SME Development Office – was established in 2018 to support the development of entrepreneurship and coordinate provision of technical and business services.
- ✓ The service portfolio of the EPO has been expanded to improve business competitiveness on the international market.

Area for improvement	Recommendation	Time frame	Responsibility	
<ul style="list-style-type: none"> • Policies and institutions do not efficiently address the issues that lead to the mismatch on the market for technical and business services and the overreliance on donor support. 	<ul style="list-style-type: none"> ✓ Increase public-private collaboration in technical and business services to identify market needs and draw on the experience of both private sector providers and donor-based projects. 	Medium-term	MEDT	
	<ul style="list-style-type: none"> ✓ Consider introducing (and promoting the pursuit of) certification programmes of quality assurance for private providers of technical and business services, to build trust among citizens and regulate the market. 			
		<ul style="list-style-type: none"> ✓ Raise awareness about technical and business services and their importance for SME development (such as by conducting seminars or distributing informational material). 	Short-term	SMEDO (in cooperation with the Ukrainian Chamber of Commerce and Industry)
		<ul style="list-style-type: none"> ✓ Develop an online register of all public and private providers of technical and business services in Ukraine, based on a review, include links to funding opportunities for SMEs and a filtering tool to sort by location and field of expertise. 		
	<ul style="list-style-type: none"> ✓ Provide the register on the official website of the SMEDO once it is launched. 			
<ul style="list-style-type: none"> • Assessments of tax policy have not been conducted, causing the economy to miss out on the potential benefits of either sector-specific or economy-wide fiscal incentives for innovation. 	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the tax policy framework and evaluate the economic benefits from introducing fiscal stimulation for innovative enterprises (sector-specific assessment or cost-benefit analysis could help identify whether and which incentives maximize return in terms of sectoral growth). 	Medium-term	Ministry of Finance	
<ul style="list-style-type: none"> • No monitoring and evaluation activities are conducted of capacity-building and educational programmes for entrepreneurship. 	<ul style="list-style-type: none"> ✓ Improve monitoring and evaluation of educational and promotional activities (for example, regularly collect and publish data on training and support programmes for entrepreneurs). 	Medium-term	SMEDO EPO MEDT	

Source: UNECE.

Sub-pillar II: Innovation promotion

Promoting innovation requires the Government to invest in establishing platforms where young companies can develop and test innovative ideas.

Business plan and start-up competitions

National and regional competitions strengthen innovative development. With the EEN-Ukraine Consortium, the MoES organizes an annual All-Ukrainian Innovation Festival, creating linkages between investors and local entrepreneurs, and the Vinnytsia regional competition distributes cash vouchers to winning start-ups. A current challenge is the scarcity of evaluation and regular monitoring of projects following the receipt of capital. To this purpose in 2019 the Government launched a dedicated national scheme, the Ukrainian National Start-up Fund. It supports innovation projects in strategic areas defined by an independent supervisory board. Following the Fund's first Pitch Day in early 2020, eight projects were awarded start-up grants, six of them at the seed development stage and two at the pre-seed development stage. Detailed information on the funds supporting research and innovation appears in table IV.2.

Table IV.2 Funds supporting RDI

Provider	Established by	Main objective	Allocated funds	Year introduced
Horizon 2020	EU	Provide research and innovation funding for multinational collaboration and individual projects	\$83.4 billion	2014
Inventions Support Fund	State Finance Institution for Innovations	Stimulate the creation and use of inventions (utility models) and industrial designs	\$4.3 million; \$21,000–85,600/grant	2018
National Research Foundation	Cabinet of Ministers	Support basic and applied research in the form of grants	\$11.1 million	2018
National Start-up Foundation	Cabinet of Ministers	Enhance innovative development via research commercialization	\$17.1 million; \$25,000–30,000/grant	2019
Western NIS Enterprise Fund	U.S. Agency for International Development	Strengthen export promotion and local economic development	\$34 million (legacy programme)	2015

Source: UNECE.

Support for RDI investment

According to the MEDT Cross-sector Export Strategy 2019–2023, 17 per cent of Ukrainian companies consider themselves to be innovative, compared with the EU average of 49 per cent (Ukraine, MEDT, 2019a; ITC, 2018). The strategy identifies low access to finance as a main impediment to innovation activity and high-tech manufacturing.

Although R&D loans are generally unavailable, the State Finance Institution for Innovations provides support in the form of loans to innovative economic entities, in addition to a range of services. Preferential loans and guarantees are further envisaged in the amended Law on State Aid to Business Entities (Ukraine, 2018a). In addition, the Entrepreneurship Development Fund provides loans at favourable rates as well as partial compensation of interest rates. In 2020 it was allocated approximately €67.6 million from the State budget (Ukraine, 2020).

Technology incubators and accelerators

The SME support infrastructure comprises 67 registered business incubators (Ukraine, MEDT, 2019b). According to the MoES, 24 of them specifically target innovative enterprises (Ukraine, 2019a). Yet, assessments show that only a few are effective and many are not operational (EU, 2017). A principal challenge for incubators in the EESC region is their high dependency on grant funding, which limits the scope of their activity; the lack of active monitoring and evaluation of incubators allows inefficiencies to persist. In addition, the potential of public R&D institutions to incubate ideas remains unexplored. Nevertheless, the USAID Business Incubators project offers start-ups opportunities to attract seed funding, while Ukraine's High-Tech Office provides integrated support to high-tech start-ups through incubation and acceleration services, including finance and coaching. The private sector also contributes actively to support for technology-based enterprises, providing acceleration services and innovation spaces for lab work, co-working and prototyping. A prominent example is the rapidly expanding UNIT.City Innovation Park in Kyiv, which comprises eight accelerators and state-of-the-art high-tech laboratories.

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ National and regional competitions have been established to support the growing start-up movement and create platforms for knowledge-sharing and product development.
- ✓ Several state funds have been established to stimulate research and innovation activity in Ukraine on a competitive basis.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Low access to finance hinders innovative start-ups and firms in growing their businesses, as commercial banks require high collateral. 	<ul style="list-style-type: none"> ✓ Stimulate investment in innovative activities by mainstreaming concessional finance for innovative projects (such as targeted R&D loans). 	Medium-term	MEDT
	<ul style="list-style-type: none"> ✓ Consider expanding direct financial incentives for R&D (such as credit guarantees, interest rate refunds and equity financing). 		
<ul style="list-style-type: none"> • The limited capacity of business incubators hinders early-stage development of start-ups and innovative enterprises. 	<ul style="list-style-type: none"> ✓ Learn from the few operational incubators and transfer their experience. 	Medium-term	MEDT
	<ul style="list-style-type: none"> ✓ Conduct a study of international best practices on improving the innovation support infrastructure. 		
	<ul style="list-style-type: none"> ✓ Set up a monitoring and evaluation framework to assess the impact of the innovation incubators. 		

Sub-pillar II IPO evaluation and recommendations (Concluded)

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The potential of using public R&D institutions for incubating innovative projects is not fully explored, while links with the private sector are insufficient in aligning research activity with market needs. 	<ul style="list-style-type: none"> ✓ Leverage the capacity of public R&D institutions to incubate ideas and develop industrial prototypes that correspond to the market needs, build relevant incentive structures and support the creation of a knowledge market. 	Medium-term	NASU
	<ul style="list-style-type: none"> ✓ Improve the resource base of regional research institutions. 		

Source: UNECE.

Sub-pillar III: Relationships and linkages

Schemes that support linkages between science and industries help create innovative ecosystems by assisting scientists and businesspeople in commercializing research, creating products and developing new organizational processes.

Business networks and clusters

The technology and industrial sectors are well represented by enterprise unions and business associations, which serve as vehicles for networking and collaboration. The Ukrainian Association for Innovation Development unites leading international and national companies in IT, high-tech, machine building, microelectronics and similar industries. In 2019, the Association of Industrial Automation of Ukraine and the Council of Entrepreneurs under the Cabinet of Ministers established the Industry4Ukraine platform, uniting interested groups and associations in the International Trade Center (ITC), engineering and machine building markets.³ The platform, established in 2019, supports development in the country towards the Fourth Industrial Revolution (2016) by promoting industrial policy (APPAU, 2020). The organization of international business events and matching services are run by the Ukrainian Chamber of Commerce and Industry, a member of the EEN-Ukraine consortium, and the European Business Association, which aim to expand investment and trade opportunities for Ukrainian enterprises.

Public-private partnerships have the potential not only to create synergies but also to develop coordination mechanisms that correctly identify sectoral needs and engage businesses in policy dialogue. One such example is the Digital Agenda for Ukraine 2020, which was jointly developed in 2016 by the High-Tech Office, private sector experts, the MEDT, the Verkhovna Rada Committee on Informatization and Communication, and the President's Administration.

Despite the growing creation of clusters (with 30 registered in 2019), the innovation policy lacks initiatives to develop regional clusters. Although several market-driven clusters have arisen in the IT and agriculture sectors, many regional cluster programmes are not fully operational. Among them is an investment and technology cluster, recently created

along with several other industrial clusters (Ukraine, 2019a). Only a few of the technology clusters are operational. The lack of a clear policy framework and data collection effort for clusters keeps information on them fragmented and prevents a comprehensive cost-benefit analysis.

Innovation support infrastructure

Ukraine has a vast array of innovation infrastructure elements, ranging from science parks and technology transfer offices to centres for commercializing intellectual property (table IV.3). Some of these organizations, however, are not operational due to lack of finances or insufficient innovative projects, leaving the number of active elements unknown. For instance, the Law on Science Parks envisages that those entities will provide the material and technical base for research commercialization, yet in recent years they have exhibited poor financial performance. In addition, the State Regional Development Strategy 2020 defines a regional network of industrial parks; 29 parks were established in the period 2017–2020.

Table IV.3 Innovation infrastructure, 2017

Innovation infrastructure element	Number of registered units
Science parks	26
Technology parks	16
Industrial parks	40
Technology transfer centres	24
Innovation centres	22
Centres for intellectual property commercialization	38
Innovative incubators	24

Source: Institute for Economics and Forecasting, National Academy of Sciences of Ukraine, MoES.

Academia-industry collaboration and mobility

Although it is widely recognized that research institutions that cooperate with business make a stronger contribution to the economy overall, and innovation in particular, and enjoy a more sustainable footing, in Ukraine, academia-industry cooperation remains underdeveloped. Several schemes do contribute to the formation of such linkages, including enterprise traineeships for HEI personnel, dual general-vocational education and the Ukrainian-German training centre for engineering at the Kyiv Polytechnic Institute of the National Technical University. The EU-funded project “Cross-regional Network of Technology Transfer”, supported by the State Regional Development Fund, aims to establish several technology transfer centres during the period 2018–2021 (Ukraine, 2018b). These schemes, however, have limited capacity to build strong

industry-science linkages. One of the root causes of this limited capacity identified by the MEDT is the absence in universities and public R&D institutions of stimulating conditions for developing products and creating intellectual property (Ukraine, MEDT, 2019a). The lack of technology assistance, fuelled by a general decline in interest in RDI, inhibits partnerships between business and academia.

Another constraint is the lack of direct State financial support for innovation in the form of vouchers or matching grants. Innovation vouchers, which have been found to have positive impacts on emerging innovation dynamics (Matulova, 2015; Speisberger and Schoenbeck, 2019), are generally not available. An exception is the climate innovation vouchers in agribusiness that the EBRD grants to support the development of green business solutions. To improve industry-science linkages, further policy efforts are needed in the direction of competitive funding.

Diaspora networks

Although Ukraine has no comprehensive national strategy for mobilizing its diaspora, separate initiatives with a limited scope exist, such as the Forum of Ukrainian Research Diaspora of the National Academy of Sciences of Ukraine (NASU) and conferences organized by the International Institute for Education, Culture and Cooperation with Diaspora (2014). According to the Ministry of Social Policy, over 3.2 million Ukrainians – including many successful entrepreneurs and researchers – resided abroad permanently as of 2018. This ample potential should be leveraged for development at home.

Gender equality

Another important consideration in this sub-pillar is gender equality – better use of women's skills is critical for the development of innovation, especially given the rising proportion of female tertiary-degree graduates, professionals and technicians (see chapter II). Among the latest developments in legislation on gender issues is the adoption of the State Social Programme of Equal Rights and Opportunities for Women and Men until 2021 (Ukraine, 2018c). Special provisions for female entrepreneurship are also included in the SME Strategy 2020, the Export Strategy 2017–2021 and the Poverty Reduction Strategy. Further progress faces several challenges, including limited funding of the State programme, scarce public information on the implementation of action plans, and lack of gender-disaggregated statistical data in many areas, especially business statistics. International donors implement several projects. Facilitating women's participation in decision-making is one of the objectives of the Partnership for Local Economic Development and Democratic Governance (PLEDDG) project funded by the Canadian Government (PLEDDG, 2020).

Sub-pillar III IPO evaluation and recommendations

Achievements

- ✓ Several public-private partnerships have been established by business associations and enterprise unions suggesting strong development of business networks and synergies.
- ✓ Gender equality perspectives are integrated in several strategic policy documents and a dedicated programme at the national level has been adopted.

Area for improvement	Recommendation	Time frame	Responsibility	
<ul style="list-style-type: none"> • Industry-science linkages are not stimulated through innovation voucher schemes, which can have positive effects on emerging innovation dynamics; cooperative grants are not available as part of the innovation policy mix. The limited linkages between public R&D institutions, HEIs and businesses represent missed opportunities for collaborative projects. 	<ul style="list-style-type: none"> ✓ Consider introducing direct public funding instruments in the form of innovation voucher schemes to stimulate the implementation of innovative ideas on a non-competitive basis. 	Medium-term	MEDT	
	<ul style="list-style-type: none"> ✓ Introduce competitive cooperative R&D grants to promote collaboration between academia and industry in a transparent institutional framework, ensuring close monitoring and regular evaluation. 	Medium-term	NASU	
	<ul style="list-style-type: none"> ✓ Support public R&D institutes in establishing structures and capacities needed for strengthening industry-science linkages. 	Medium-term	MoES NASU	
	<ul style="list-style-type: none"> ✓ Expand channels of collaborative research and extend the technology transfer system to facilitate intellectual property transactions. 			
<ul style="list-style-type: none"> • Elements of the innovation infrastructure are often ineffective due to a lack of finance, a decline in interest, and low capacity. 	<ul style="list-style-type: none"> ✓ Improve technology transfer infrastructure at HEIs to commercialize innovations from public institutions. 			
	<ul style="list-style-type: none"> • Cluster development is hindered by a lack of critical mass in specific industries and the absence of stable linkages for building a strong regional economy. 	<ul style="list-style-type: none"> ✓ Formulate an explicit cluster policy framework that will be the basis for developing clusters, with the aim of increasing their international competitiveness by strengthening regional linkages (for example, consider establishing a regional cooperation strategy among stakeholders from industry, academia and government). 	Medium-term	MEDT NASU
	<ul style="list-style-type: none"> • National statistics on enterprise activity lack gender-disaggregated data. 	<ul style="list-style-type: none"> ✓ Conduct a comprehensive assessment of the innovation support infrastructure and develop a set of internal standards. 	Medium-term	MEDT MoES
	<ul style="list-style-type: none"> ✓ Integrate advisory services in the portfolio of infrastructure elements, to cover the whole innovation cycle from early-stage project development to product commercialization. 			
<ul style="list-style-type: none"> • National statistics on enterprise activity lack gender-disaggregated data. 	<ul style="list-style-type: none"> ✓ Identify areas that need policy intervention in terms of gender equality by integrating gender disaggregation into national statistics on enterprise activity. 	Medium-term	National Statistics Service of Ukraine	
<ul style="list-style-type: none"> • Diaspora networks need further stimulation in order to transfer entrepreneurial experience and talent to the domestic market. 	<ul style="list-style-type: none"> ✓ Develop a national diaspora mobilization strategy with outlined priorities and an action plan to make use of diaspora networks. 	Medium-term	NASU International Institute for Education Culture and Cooperation with Diaspora	

Source: UNECE.

Sub-pillar IV: Knowledge diffusion

Mechanisms that ensure equal and widespread access to information are vital to creating an innovative ecosystem in both the public and private sector, serving as channels for the distribution and intersectoral flow of information.

Public procurement for innovation

The Law on Public Procurement does not envisage special measures to support demand for or build platforms for innovation. In 2019, however, the MEDT took a step towards improving the efficiency of public procurement by establishing the Professional Procurement State Institution as a centralized procurement organization. In addition, separate initiatives support this dimension. For example, the donor-driven project “Transferring experience with green public procurement in Slovakia and Ukraine”⁴ has raised awareness about public procurement through an online educational course for state officials. Also, the State Finance Institution for Innovations stimulates the creation and use of utility models and industrial designs in competitions under the Invention Support Fund. The winners receive funding for several services, including lab tests, preparation of patent applications and business model development, with all services being procured through the State procurement system. As an effective response to the need for innovative solutions with a competitive advantage, a pre-commercial procurement approach could stimulate the demand side in the emerging dynamics of innovation while supporting innovative start-ups and SMEs, too.

Digitalization and e-governance

The digitalization of the economy has garnered substantial attention in recent years, as shown in the Concept of Digital Economy Development 2018–2020, including considerable investment into broadband infrastructure (Ukraine, 2018d). Although the Government has yet to adopt the national broadband development plan, room remains for improvement in broadband access in rural areas (see chapter II). Nevertheless, the Ministry of Digital Transformation (established in 2019) works towards the digitalization of SME services, narrowing the digital gap. According to a 2019 World Bank study, the rapid growth of the ICT sector in recent years has led to a rise in demand for qualified professionals. At the same time, Ukraine has experienced a dramatic brain drain of people with expertise in emerging technology areas, including artificial intelligence, cloud computing and cybersecurity. Nevertheless, positive developments are underway in high-performance computing: the national grid infrastructure combines the resources of 26 universities and R&D institutions, providing researchers with access to resources through nine virtual organizations. In addition, in accordance with the Law on access to public information (adopted in 2014), the Government established a unified, public, open data portal, providing access to metadata collected by the public sector for commercial purposes and strengthening cross-sectoral linkages.

Other policy issues

The existing policy tools do not sufficiently address present gaps of knowledge diffusion in Ukraine with regard to leveraging the potential of industrial technology assistance, brokerage schemes for technology upgrading, and standards, testing and certification instruments for SMEs. Nevertheless, the 2020 Strategy for Development of Technical Regulations Systems provides indirect support for the latter, although it does not specifically target SMEs.

Sub-pillar IV IPO evaluation and recommendations			
Achievements			
<ul style="list-style-type: none"> ✓ A centralized procurement organization was established, the Professional Procurement State Institution. ✓ Evident efforts have been made to introduce green procurement policies for sustainable development. ✓ A unified, public open data portal was established, promoting transparency in the activities of state bodies. 			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The ample potential of public procurement as a lever for innovative development has not yet been fully explored. 	<ul style="list-style-type: none"> ✓ Stimulate the development of innovative goods and services through demand-driven policies; for example, consider adopting a pre-commercial procurement approach to stimulate RDI activity and create a competitive advantage for innovative entrepreneurship while modernizing public services. 	Medium-term	MEDT Professional Procurement State Institution
<ul style="list-style-type: none"> • Information and brokerage services for upgrading technology and for assisting firms in planning and implementing innovative activities are insufficient, keeping SMEs from optimizing their work processes. 	<ul style="list-style-type: none"> ✓ Expand innovation support services by introducing brokerage schemes (such as brokerage events, collaborative project planning and matching) in the portfolio of innovation infrastructure elements and/or in cooperation with the private sector. 	Medium-term	MEDT
<ul style="list-style-type: none"> • The provisions of industrial technology assistance do not match demand in the SME sector, thus hampering modernization of SME production processes. 	<ul style="list-style-type: none"> ✓ Stimulate further the economy's transition to Industry 4.0 by providing SMEs with relevant market intelligence services, technical assessment and consultancy, ICT training and R&D project assistance (such as integration in the mandate of science and technology and industrial parks, technology transfer centres and programmes implemented by the SME Development Office). 	Medium-term	MEDT SMEDO

Source: UNECE.

Sub-pillar V: Research and education

Recognizing the requirements of today's labour markets and fast-evolving technological environment, governments have pursued a multidisciplinary approach to education through STEM initiatives. Policy measures to enhance research are designed to promote research excellence, collaboration and commercialization.

Policies to increase the number of STEM graduates

A positive feature of the education system are the many incentives that promote science, technology, engineering and mathematics (STEM) in general education. They include scholarships, national competitions and extra credit on external evaluations, with a clearly defined policy and institutional framework. A secondary school reform with a pronounced focus on STEM began in 2016 with the adoption of the Concept of Implementation of State Policy on Reforming General Secondary Education "New Ukrainian School" for the period up to 2029 (Ukraine, 2016a). Yet although undergraduate students benefit from STEM exchange programmes, the higher education subsector lacks financial incentives for STEM-related fields at universities, such as scholarships, grants and fellowships. Further development is needed, as demonstrated by the skills shortage that businesses report (see chapter II) (World Bank, 2017). This need runs up against serious long-term constraints, such as the low number of qualified STEM teachers, and also sheds light on some of the structural problems of the economy – such as the rapid outflow of students and young scientists engaging with temporary placements in MNEs abroad.

Policies to foster research development

State funding of research is approved on an annual basis. National priority research areas for the period 2011–2020 are defined by the Law of Ukraine on the Priority Directions of Science and Technology (adopted in 2001) and last approved by the Cabinet of Ministers in 2016 (Ukraine, 2016b). Strategic (10-year) and medium-term (five-year) priority directives in the sphere of innovation are further set by the Law of Ukraine on the priority directions of innovative activities. The NASU, as the main research organization in the country, receives the highest share of the State research funding (61.2 per cent in 2018), allocated under the State Budget to 25 public institutions for fundamental and applied research, state programmes, state orders and international projects (Ukraine, MoES, 2019).

Enhancing research through effective support measures is particularly important for Ukraine because of the rapid decline in the number of researchers over the past decade (from 133,744 in 2010 to 59,392 in 2017). Thus, to expand the R&D talent pool, the National Research Fund of Ukraine (established in 2018) provides competitive grant funding through individual, collective and institutional awards (see table IV.2). A total of Hrv 260 million was allocated from the 2019 State budget to the Fund ahead of its launch. Another recently introduced support measure is the collaborative science and technology competitions organized by the NASU. In 2020, the NASU will begin awarding

grants to institutions conditional on external counterpart funding, thereby improving the overall technology transfer system and contributing to mobility between academia and industry (Ukraine, NASU, 2019). Cross-border cooperation is also sustained through several international projects and partnerships with foreign research institutions.

Sub-pillar V IPO evaluation and recommendations

Achievements

- ✓ An effective policy mix has been applied to stimulate STEM education in general education .
- ✓ The National Research Fund was established in 2018 to foster research and innovation activity in the country.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • Competitive funding mechanisms for research are limited. There are no calls for proposals aimed at stimulating cooperation between the private sector and academia. 	<ul style="list-style-type: none"> ✓ Expand competitive research funding to increase the efficiency of the science and technology system. 	Medium-term	NASU
	<ul style="list-style-type: none"> ✓ Consider introducing a collaborative funding scheme conditional on a partnership between a public R&D institution and private enterprise. 		
<ul style="list-style-type: none"> • Incentives for STEM degrees at HEIs are insufficient to attract tertiary degree students in related fields. 	<ul style="list-style-type: none"> ✓ Promote STEM fields in higher education to ensure a future pool of talent (for example, develop a web-based STEM portal to provide information on opportunities and support infrastructure, hold promotion days at research institutes, offer financial incentives in the form of specific scholarships). 	Short-term	MoES
<ul style="list-style-type: none"> • Research support schemes lack a set monitoring and evaluation framework. 	<ul style="list-style-type: none"> ✓ Establish a framework for monitoring and evaluation to integrate in all current and future research funding initiatives to increase their efficiency by standardizing and to make it possible to conduct an impact assessment. 	Short-term	MoES

Source: UNECE.

Notes

- ¹ The BEEPS V data set was last updated on 23 August 2017.
- ² Deloitte, The Ukrainian Parliament adopted a law that substantially changes the Ukrainian taxation system, 11 January 2018.
- ³ Other initiators of the movement are the Institute for Economic Research and Policy Consulting, the Chamber of Commerce and Industry of Ukraine, the Office of Reform at the Cabinet of Ministers, the European Innovation Agency and the SOE Ukrpromzovnishekspertiza.
- ⁴ The project is conducted by the non-governmental organization GoLOCAL in partnership with the Slovak Centre for Communication and Development and co-financed by the Slovak Agency for International Development Cooperation (SlovakAid).

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Website

SME Development Office: <https://sme.gov.ua>

Chapter IV

PILLAR III: INNOVATION POLICY PROCESSES

Pillar III examines the underlying processes for innovation policymaking: how data, evidence and stakeholder input inform how decisions are made, put into practice, monitored and evaluated, based on the experience from one specific policy. Ten detailed policy indicators address each step in the policy process of that specific policy, from problem identification or market failure to policy design, implementation, evaluation, impact assessment and learning.

In consultation with the MoES and the NASU of Ukraine, UNECE selected the Strategy of Innovation Development 2030 for assessment, on the basis of these criteria:

- i) The policy measure is intended to foster science, technology and innovation (STI) in the country.*
- ii) The policy measure reflects the standard innovation policy practices in the country.*

Pillar III also derives broader policy lessons for innovation policymaking.

Innovation policy processes – strengths and weaknesses

Ukraine's Innovation Strategy is a necessary initiative with a long-term vision and targets for developing the country's innovation system. It emerged from a structured and open consultation process with relevant stakeholders, and its design and content are partially in line with international good practices, such as its coherence with relevant overarching and sectoral policies, its duration and the types of targets. The strategy's shortcomings lie in the underlying analysis, which does not identify, analyse and quantify market failures; evaluate corresponding policy options; present comparisons of viable alternatives and budgetary impacts; or include structured implementation and post-implementation modalities. It lacked a complete budget and an action plan when the research for this publication was undertaken.

More broadly, the IPO analysis found that, despite democratic and governance reform initiatives over the past five years – most notably the Strategy for Public Administration

Reform and the Law on Civil Service – the policy design, development and coordination system in place in line ministries and other government bodies with STI policy competencies is still not fully functional and significant gaps remain in the practices of planning and making policy. Monitoring and evaluation are insufficient and overly focused on outputs, with few systemic linkages to ensure that learning feeds into the policy design process. These issues affect the quality of policies and hence the innovation performance of the country.

Policy overall: governance and democratic reform gaining traction

Ukraine consistently ranks within the bottom third on global indices of governance because of its malfunctioning justice system and non-transparent government practices, combined with pervasive business-political ties and a weak civil society. Nevertheless, Ukraine has taken important steps towards modernizing public governance, in particular since 2016, when the legislature adopted the Strategy for Public Administration Reform and the Law on Civil Service. Both are widely regarded as ambitious but relevant flagship initiatives to enhance the effectiveness and accountability of public administration (Iarema, 2019).

Indeed, since 2016, Ukraine has undertaken several initiatives to modernize public services, with substantial donor support (SIGMA, 2018), particularly from its EU partners. The civil service has started to bear less of a political imprint and operate more professionally and transparently, government bodies have enhanced their capacity to implement reforms and digitization is under way (Iarema, 2019). Reform of civil servant remuneration has begun, and important legal changes in the recruitment of civil servants are being enforced (SIGMA, 2018). The Government has also conducted a comprehensive process of political decentralization to restructure relations between the centre and the periphery, strengthen the country's resilience and improve governance (Romanova and Umland, 2019). The new Government has vowed to prioritize governance, judicial reform and anti-corruption efforts; however, given the scope and ambition of efforts under the new President, the prospects are not clear.

Policy focus: Strategy of Innovation Development 2030

A national innovation strategy is an overarching, guiding policy document that defines a government's vision, objectives and resource commitments for developing innovation policy. It helps coordinate activities across the numerous government bodies involved in innovation policymaking and prioritizes policy action, targeting challenges while building on opportunities and resources. Given this multidisciplinary nature and the various government actors involved, government strategies related to innovation are considered particularly vital for coordination purposes.

Nowadays, most high- and middle-income countries elaborate high-level policy strategies to foster innovation (IDRC and OECD, 2010). According to the OECD (2014, p. 90), these strategies can serve three important functions in government policymaking:

1. "They articulate the government's vision regarding the contribution of [STI] to their country's social and economic development.
2. They set priorities for public investment in STI and identify the focus of government reforms (such as funding of university research, evaluation systems). They also mobilize

STI actors towards specific [SDGs], such as energy, environmental issues or health, and may help steer the investment of private actors and increasingly autonomous universities and public research institutes towards priority areas or technologies.

3. The elaboration of these strategies can engage stakeholders (the research community, funding agencies, business, civil society, regional and local governments) in broad consultations that will help building a common vision of the future and facilitate coordination within the innovation system.”

The content of innovation strategies depends on the specific needs of an economy. Governments should consider several building blocks and common characteristics that this chapter uses as benchmarks:

1. Clear vision. Innovation strategies should contain a clear vision of the improvements to pursue, ensure a transparent regulatory and incentive structure, and define possible technological trajectories in line with the objectives of the policy (IDRC and OECD, 2010).
2. Evidence-based, for an identified market failure. The vision in a strategy should be founded on the dynamics observed in the private and public sectors (IDRC and OECD, 2010) and prepared on the basis of empirical evidence, the identification of market failures and opportunity tools such as scenarios and strengths-weaknesses-opportunities-threats (SWOT) analyses. The process of preparing and designing the strategy is potentially more important than the document itself, as it helps identify barriers and hidden opportunities, and promotes a learning process (OECD, 2014).
3. Effective coordination. With multiple layers of support policies, the effectiveness of coordination efforts is important, particularly in developing countries, which need to adjust and coordinate these layers of intervention so as to promote innovation effectively, as well as other, complementary SDGs such as sustainability or alleviation of poverty (IDRC and OECD, 2010).
4. Appropriate time frame. National innovation strategies differ in their time frames but rarely exceed five to 10 years. In rare cases the duration is open, as in Colombia’s National Innovation Strategy, for example. Many European countries have defined their national strategies in the time frame of the EU’s Horizon 2020 Programme (OECD, 2014).
5. Benchmark targets. National innovation strategies should include targets to benchmark performance and progress. Commonly, these are expressed as quantitative targets for R&D spending. Countries have also set targets in terms of innovation outputs such as patents, citations and publications (as in the Russian Federation) or even educational outcomes (as in Denmark and Switzerland) (OECD, 2014). Ideally, a strategy should include specific innovation targets.
6. Action plans. Performance targets must be complemented by action plans, which set shorter-term steps, milestones and measures of progress, as well as responsibilities, specific assignments and the timeline. Action plans define the implementation sequence of strategies and make them operable and their goals achievable. National innovation strategies are often implemented by ministries or specific funding and innovation agencies. They may also be operationalized through regional strategies or even contracts, such as university performance agreements (OECD, 2014).

7. Evaluation. To ensure accountability and measure the outputs and outcomes, evaluation rules and tools should be incorporated in the implementation of strategies. Evaluation typically concerns not only discrete policy interventions or instruments but also entire research portfolios or the overall research and innovation system (OECD, 2014).

Ukraine's Strategy of Innovation Development 2030 is the overarching, guiding policy document that defines the Government's vision and objectives for developing innovation policy. It was prepared by the MoES and adopted by the Cabinet of Ministers on 10 July 2019. It has three main components: (a) the legal framework of innovation activity, (b) innovation infrastructure development and consulting support, and (c) educational and entrepreneurial cultural activities. It effectively replaces the State Innovation Policy, in place since 2009. The implementation time frame extends until 2030.

The main goal is "creating the innovative ecosystem of Ukraine to ensure the rapid and qualitative transformation of creative ideas into innovative products and services". Three sub-goals correspond to the overall objective:

1. To create favourable conditions for accelerated growth of the innovative sphere and post-industrial branches of the economy
2. To overcome current negative trends in the development of innovations and innovative potential, creating conditions for expanding its reproduction
3. To increase the efficiency of using budget funds directed towards the development of science and innovation

Table V.1 Overview of sub-pillars and indicators for innovation policy processes

Sub-pillar I: Preparation	Sub-pillar II: Design	Sub-pillar III: Implementation	Sub-pillar IV: Post-implementation
Innovation foresight	Planning	Amendment of policies	Ex-post evaluation
Rationale	Decision-making	Review of the policy against its action plan	Adaptation
	Private sector consultation		
	Coherence		

Source: UNECE.

Sub-pillar I: Preparation

Sound preparation of policies sets the foundation for the policymaking process. Public intervention should, where appropriate, depend on the identification of market failures along with future trends that will affect the area of intervention.

Innovation foresight

The analysis revealed that innovation foresight – the practice of capturing future trends and perspectives for research activities to incorporate or adjust in innovation policies – is sporadically integrated into the policymaking process. According to interviews conducted by the Institute for Economic Research and Policy Consulting (2019), a comprehensive policy foresight exercise took place in 2011.² In a second step, the Institute conducted a comparative analysis of these trends with the current potential of Ukraine, taking into account the country's commitments to the SDGs. In addition, the MoES has introduced a series of consultations with businesses regarding their needs for research and innovation. About 10 such meetings have been held and more are planned. The first results were the follow-up received from businesses and the development of the first steps for decision-making in accordance with the proposals of businesses. During the preparation of the Innovation Strategy, no foresight tools or methods were used.

Policy rationale

The vast majority of innovation stakeholders consulted for the IPO analysis considered that the preparation of an innovation strategy was long overdue. This perception can be attributed to a number of factors: the limited impact of the State Innovation Policy, an overall lack of a clear strategic vision to put Ukraine on an innovative development path and the lack of a cross-sectoral document addressing science and innovation in the country. One stakeholder stressed the need to move away from the ad hoc approach to innovation, which has produced a flourishing of initiatives that have not led anywhere.

The Innovation Strategy itself acknowledges that “the approaches to the formation of the State Innovation Policy, which have been in place for the last [10] years, have proven incapable of raising Ukraine to a higher [innovation performance] level, and therefore require radical change” and that “previous attempts to formulate a state policy for innovation support in Ukraine through selective assistance in the development of particular industries, sub-sectors and projects have had limited positive impact” (Ukraine, Cabinet of Ministers, 2019, p. 6). Between 2013 and 2018 various government bodies developed almost 40 sector-level strategic documents with provisions relevant to the development of innovation in specific areas, with limited synergy in content and limited coordination. Thus, the preparation of a new innovation strategy seems justified.

Nonetheless, the underlying analysis, which determines the issues to tackle and the way forward to resolve them, had limitations. To conceptualize the strategy, CASE Ukraine, a non-governmental think tank engaged in economic research, policy analysis and

macroeconomic forecasts – albeit not with specific expertise in innovation policy, provided an analysis of the innovation ecosystem. Based on this concept, the MoES drafted the rationale for the strategy.

The rationale comprehensively reviews Ukraine's innovation performance on the basis of recent international benchmarking studies, including the GCI, the Innovation Index, the EU Innovation Scoreboard and the GII, as well as the latest data from the State Statistics Service. It also articulates the Government's vision of how innovation contributes to social and economic development and outlines a range of broad actions for how to improve innovation performance and achieve the vision.

Where the analysis falls short is in identifying, analysing and quantifying the underlying constraints and market failures that the strategy responds to and should address. Nor does it use opportunity tools such as scenario analysis and SWOT analysis. It contains no comparison of viable alternatives or assessment of budgetary impacts, although, considering the measures proposed, these are bound to occur. It provides no information on how the strategy is to be implemented – an action plan is still pending adoption – or how the effects of the strategy will be monitored and evaluated, including the metrics to be used, the institutions responsible and the processes involved.

The strategy contains an analysis of the state of affairs of the national innovation ecosystem and of the structural issues the strategy aims to improve. Yet the lack of cost-benefit analyses to underpin the policy measures prescribed and the lack of a concrete operational direction hinder the establishment of clear links between the ambitious objectives and the actions supporting progress towards them.

Broader policy issues

The legal framework places responsibility for preparing policy within ministries. Three main line ministries deal with STI policies: the MoES; the Ministry for Development of Economy, Trade and Agriculture; and the Ministry of Digital Transformation. According to the Law on Central Executive Authorities, ministries ensure the formation of state policy in one or several areas, and other central executive bodies oversee the implementation of these state policies. Indeed, it is not uncommon for more than 60 per cent of a ministry's staff to be responsible for developing policy (SIGMA, 2018).

In Ukraine, two legal requirements aim at ensuring a standard of quality in the preparation of draft laws and policies. On the one hand, the Cabinet of Minister's Rules of Procedures stipulate that an impact assessment of draft legislative and policy proposals is mandatory and must contain a problem analysis, the objectives, the reasons for adoption and an assessment of the regulatory impacts as well as impacts on the labour market (SIGMA, 2018). On the other hand, the Law on the Principles of State Regulatory Policy obliges policy drafting institutions to assess the impact of all regulations that affect the private sector. This includes most innovation-related regulations.

The practicability and implementation of these two requirements entail at least four issues:

1. Policy development bodies do not always comply with the requirements. Specifically, ministries have a widespread practice of submitting draft policy and legislative proposals directly to members of Parliament with the aim of ensuring adoption

while avoiding quality control by the Government and bypassing requirements for evidence-based policymaking.

2. The quality of the analyses conducted is low. As in the Innovation Strategy, they lack insight into the justification for the proposal and relevant impacts of its implementation.
3. Particularly for policy strategies, policy documents rarely include proper calculations of costs (whether in terms of overall cost planning or in terms of a link to subsequent resource allocation), which has a significant impact on their allocation and ultimately their implementation (SIGMA, 2018).
4. Perhaps most strikingly, the two requirements are not aligned in their legal framework or in their implementation. Policymaking institutions that work on private sector development are required to prepare regulatory impact assessments (RIAs) and explanatory notes with largely overlapping content. This creates additional burdens for these institutions without providing added value to decision makers. The business community confirmed the low quality of policy preparation in a recent survey, in which less than a third of respondents agreed with the statement, "Laws and regulations affecting my company are clearly written, not contradictory and do not change too frequently" (SIGMA, 2018).

Sub-pillar I IPO evaluation and recommendations

Achievements

- ✓ The Government has adopted a national innovation strategy, prepared with the support of a non-governmental economic think tank, based on a comprehensive review of the country's innovation performance and responding to the need for a strategic vision to put Ukraine on an innovative development path, as well the lack of a cross-sectoral policy covering STI.
- ✓ A legal framework exists that sets quality standards for policy preparation by relevant government institutions, including the two main ministries in charge of making innovation policy.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The rationale for the Innovation Strategy is not based on market failures or a cost-benefit analysis. 	<ul style="list-style-type: none"> ✓ Improve quality-control mechanisms to ensure that cross-sectoral government strategies are evidence-based and contain the elements necessary to guarantee the quality and applicability of policies. 	Medium-term	Cabinet of Ministers
<ul style="list-style-type: none"> • Ministries submit draft policy and legislative proposals directly to individual members of Parliament, avoiding quality control by the Government. 	<ul style="list-style-type: none"> ✓ Adopt and enforce legislation that prevents these types of practices and shortcuts from occurring, which might require revising the parliamentary code. 	Medium-term	Cabinet of Ministers/ Secretariat of the Government
<ul style="list-style-type: none"> • The lack of compliance with the legal framework and the lack of alignment between the two legal frameworks for policy preparation leads to operational inefficiencies. 	<ul style="list-style-type: none"> ✓ Simplify the requirements for policy preparation, by merging the required impact assessment and RIA into one combined process, thereby reducing the burden on ministries and avoiding duplication of work (SIGMA, 2018). 	Medium-term	Cabinet of Ministers

Source: UNECE.

Sub-pillar II: Design

Public-private consultations are an integral part of the policy design process, to ensure policy relevance to market and private sector needs and to confirm the commitment of relevant stakeholders to implementing it. Innovation policy is a supplementary component of a country's overarching strategy that contributes to the achievement of the broader vision and objectives of socioeconomic development. Its priorities and activities should be consistent and coherent with relevant "non-innovation" policies.

Planning

The Innovation Strategy's time frame of just over 10 years (summer 2019 until 2030) is in line with international good practices for policy design for such a strategy. Furthermore, as prescribed earlier as one of the elements of sound design of national innovation strategies, the strategy includes targets to benchmark its long-term performance and progress. As is common, these are expressed as quantitative targets for R&D spending (increasing gross domestic expenditure on R&D to 3 per cent of GDP in 2030 from 0.45 per cent in 2017), as well as in terms of innovation outputs (for example, an increase in the share of medium- or high-tech exports to 30 per cent from 15.4 per cent in 2017). These targets seem overly ambitious and are far above the average for countries in the lower middle-income group. This raises the question of how well-founded these targets are.

The strategy recognizes international collaboration in science and innovation as a national priority. It focuses particularly on the contribution of innovation to laying the foundations for sustainable growth, improving the returns to and impact of scientific outputs, and improving the quantity, quality and relevance of the skills base – all relevant and typical foci for countries in which innovation performance lags and R&D is less intensive (OECD, 2014).

The strategy does not, however, address a broader range of SDGs and does not include specific social or environmental targets. Nor does it include a comprehensive focus on developing synergies and networks between academia and industry or improving legislative frameworks and enforcement mechanisms in property protection, IPRs and insolvency regulations – all important to complement and enhance the national innovation system.

The Innovation Strategy lacks an adopted action plan that defines short-term actions and provides a clear and actionable implementation path. As this publication was drafted, no action plan had been adopted. The strategy stipulates that action plans cover three-year implementation periods.

Public-private consultation mechanisms

A relatively broad, open and well-structured consultation process informed the design of the Innovation Strategy. A specific working group – at the initiative of the MoES, not following the legal requirement to do so – guided the overall direction of the strategy,

and seven sub-working groups developed aspects related to specific stakeholder groups such as start-ups or sole traders. About 100 stakeholders participated in the main working group, which met 10 times over the course of 10 months. UNECE interviews with stakeholder groups (line ministries, implementing agencies, business associations, chambers of commerce, academia and non-governmental organizations)¹ confirmed their involvement and the openness of the discussions.

On 22 October 2018, following the working group discussions, the MoES published the draft strategy for public consultation on its website. Comments were to be submitted by e-mail and telephone until 5 November 2018. Two working weeks is not a suitably long enough time frame for a strategic document of this significance; international practices point towards a period of at least six weeks.

After this last phase of consultations, the MoES released the report for public consultation online, including a list of the commentators. A number of comments that stakeholders made about terminology, problem definition, targets and the evaluation of the strategy were taken on board and integrated into the final strategy text.

Regarding interministerial consultations, all line ministries participated in the working group. The working group itself was closed after the Government adopted the strategy. A sign that at least some of these consultations were perceived as constructive and fruitful is the weekly coordination meeting between the MoES and the Ministry of Digital Transformation that emerged out of the working group. These coordination meetings happen at the level of deputy ministers, which is a relevant development, given that deputy ministers are charged with developing policy and drafting legislation.

Policy coherence

The Innovation Strategy is coherent with the Ukraine 2020 Sustainable Development Strategy, which contains a list of 62 reforms divided into four “vectors”. Development of innovation is one of the reforms under the vector for development. The innovation-related content of a number of other government strategies aligns with that of the Innovation Strategy; for example, the SME Strategy 2020 section on improving the competitiveness and the innovation potential of SMEs. Furthermore, the export strategy envisions facilitating innovations to boost exports, as does the Innovation Strategy. The export strategy also identifies an innovation strategy as a key requirement for Ukraine. Some efforts to layer and coordinate support policies are thus evident. A gap is the lack of any apparent link or cross-reference to the innovation law being developed by the Ministry for Development of Economy, Trade and Agriculture, pointing to the lack of coordination between these two ministries, specifically on innovation policy. Nor are there evident synergies between the Innovation Strategy and related policy documents on education or industry.

Broader policy issues

Although the practices used to design the Innovation Strategy are an example of participative policymaking and significant stakeholder involvement and coordination efforts, public scrutiny of government work and participation in policy design are usually limited across ministries, including those responsible for STI policymaking. That said, the working group was created at the initiative of the MoES and not enforced by a central authority; that is, the Ministry did not involve stakeholders because it felt legally

obliged to but because it was convinced that doing so would improve the quality of the strategy. At the heart of the participation issue is the lack of a basic law to guarantee uniform citizens' rights in interactions with the public administration, a Law on Administrative Procedures (Iarema, 2019), which is common in other countries of the sub-region.

The legal framework establishes mechanisms for public-private consultation, but not comprehensively for all types of draft policies. Furthermore, practice seems to be inconsistent. Outcomes of the consultation process are usually not described in the materials submitted by ministries to the Cabinet of Ministers of Ukraine nor made publicly available (SIGMA, 2018). Legal acts must be published within 15 days of adoption, and this is done online in practice. This practice is much less consistently applied for secondary legislation. This has negative impacts: only 39 per cent of businesses stated that information on laws and regulations affecting their business is readily available from public bodies (SIGMA, 2018).

In his first months in office, President Zelenskyy made concerted efforts to establish a more direct relationship with citizens. For example, the Government has set up the LIFT platform, which enables citizens to send in ideas and projects, and apply for jobs with the Government and local authorities. The President asked his Facebook followers to pick the new governor of Lviv from a list of three candidates (ECFR, 2019b).

Regarding interministerial consultations on policy drafts, the Cabinet of Ministers has specific rules of procedure that prescribe relevant requirements: all affected bodies must be consulted on laws, and the obligation to consult the Ministry of Justice, the Ministry of Finance and the Ministry of Development for Economy, Trade and Agriculture is specifically mentioned (SIGMA, 2018). In practice, these consultations are performed consistently, however, two omissions limit their effectiveness: the absence of administrative-level conflict resolution processes and the absence of an established minimum duration for interministerial consultations (SIGMA, 2018) do not give ministries enough time for meaningful commenting. The latter was particularly pronounced during the first few months of the new Government, during which it passed a flurry of reforms and laws quickly.

Another issue that inhibits the quality of the design of policies are the overlapping competences of public bodies in coordinating policy planning (SIGMA, 2018). For some policy areas, including innovation, responsibility is scattered or unclear. The lack of coordination between the Innovation Strategy (drafted by the MoES) and the Innovation Law (drafted by the Ministry of Economic Development, Trade and Agriculture) is a case in point.

Regarding intraministerial consultations, the internal regulations of ministries refer to the general requirements for the policy design process established by other legal acts, mentioned earlier, which include the obligation to consult all "affected departments within the ministry and the legal department as the final authority". Not all ministries have adopted such rules, however, so internal intraministerial practices have not been broadly set up across all ministries. Regarding guidelines and training, the Ministry of Justice and the Parliament developed guidelines for drafting policy, which are available online and offer solid, useful instructions. Training for policy design is not centrally organized; line ministries conduct it at will, so there is no cross-government quality assurance nor certainty that ministries are addressing the most relevant shortcomings in policy design (SIGMA, 2018).

Sub-pillar II IPO evaluation and recommendations

Achievements

- ✓ An innovation strategy has been designed in line with international practices regarding its duration, types of targets and focus.
- ✓ Comprehensive and meaningful stakeholder consultations were conducted during the design of the Innovation Strategy.
- ✓ Interministerial consultation during the design of Innovation Strategy was fruitful, and the an interministerial working group was subsequently established at the deputy minister level.
 - ✓ The Innovation Strategy is coherent with overarching and sectoral policy strategies.
- ✓ Relevant line ministries make a consistent practice of interministerial consultations on draft policies.

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> • The Innovation Strategy lacks an action plan. 	<ul style="list-style-type: none"> ✓ Develop the tools and mechanisms needed to put the strategy into practice, including these four: <ul style="list-style-type: none"> • Develop and adopt the first three-year action plan. • Secure sustainable funding for these activities from different sources. • Establish the respective institutions to implement the strategy or guarantee their operational work (financial and personal resources). • Include actions on developing appropriate capacities and mechanisms for monitoring and evaluation. 	Short- to medium-term	MoES National Council of Ukraine for Science and Technology Development
<ul style="list-style-type: none"> • Public scrutiny of government work and participation in policy design are limited, in part because of the lack of a law on citizens' rights. 	<ul style="list-style-type: none"> ✓ Adopt a law on administrative procedure to guarantee citizens' rights in their interactions with state authorities. 	Medium-term	Cabinet of Ministers
<ul style="list-style-type: none"> • Interministerial consultations on draft policies are only somewhat effective. 	<ul style="list-style-type: none"> ✓ Establish a top administrative-level coordination body with the formal mandate for solving differences of opinion among line ministries, before drafts are submitted for discussion at the political level (SIGMA, 2018). 	Medium-term	Cabinet of Ministers
<ul style="list-style-type: none"> • The civil service has no specific training on drafting policy. 	<ul style="list-style-type: none"> ✓ Develop an agenda for training on legislative and policy drafting in the National Agency of Ukraine on Civil Service, in coordination with the relevant ministries, to raise civil servant awareness of the legal frameworks for preparing policy and the importance and mechanics of evidence-based policymaking. 	Medium-term	National Agency of Ukraine on Civil Service

Source: UNECE.

Sub-pillar III: Implementation

Targets and time frames defined in the action plan provide a basis for regular reviews of implementation progress. Analysis of intermediate progress helps identify administrative, institutional and technical challenges faced during implementation and makes it possible to take necessary measures, including adjusting activity and reallocating resources.

Review of the policy against its action plan

The MoES is in charge of implementing the Innovation Strategy; however, the strategy does not have an adopted action plan. The aim of the Ministry is therefore to finalize and adopt the action plan, focusing on specific support measures that can be implemented with existing in-kind and human resources. These include an annual innovation festival – a platform for young scientists and start-ups to present ideas and to obtain mentoring support and meet potential investors, and an annual innovation market – a platform for businesses and research institutes to explore research commercialization.

When the Government adopted the Innovation Strategy, a budget declaration for 2019–2021 was adopted. In February 2020, the MoES prepared a budget request for 2021–2023. Some of the actions are likely to be financed through other strategies, State programmes and international aid. Some innovation-related activities are also envisaged in other strategic documents. For example, innovation is a focus of the SME Development Strategy. Several activities of that strategy were originally implemented with support from international donors or within the framework of other strategic documents and the national programme.

Broader policy issues

The lack of cost estimates or information on sources of funding in draft policy documents and the inconsistency between planned and actual funding severely hampers implementation of reforms. In addition, the Government or the President frequently initiate amendments during early implementation. Some 40 per cent of laws are amended within one year of adoption, which has a negative impact on the consistency and clarity of the legal framework: only 33 per cent of businesses consider government policy to be clear and stable (SIGMA, 2018).

The Government's capacity to implement reforms is likely to be enhanced over the coming months. Under the new Government, line ministries are being transformed into "policy hubs" tasked with policymaking (as opposed to public service delivery) as their chief mandate. To realize this goal, new policy directorates were introduced in ministries in 2017, and the Government has committed to filling 2,500 reform specialist positions in these directorates (Iarema, 2019).

Sub-pillar III IPO evaluation and recommendations

Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> The Innovation Strategy lacks an action plan. 	<ul style="list-style-type: none"> ✓ Adopt the strategy action plan and begin implementing the Innovation Strategy. 	Short-term	MoES National Council of Ukraine for Science and Technology Development
<ul style="list-style-type: none"> From a sustainable development perspective, the strategy's content is limited. 	<ul style="list-style-type: none"> ✓ Further enhance efforts and mechanisms to mainstream the three pillars of sustainable development across innovation policies. 	Medium-term	All line ministries National Council of Ukraine for Science and Technology Development
	<ul style="list-style-type: none"> ✓ Systematically assess the relevance of the SDGs for the priorities in the strategy and identify possible innovation fields. 		
<ul style="list-style-type: none"> The inability to legally implement policies triggers frequent amendments. 	<ul style="list-style-type: none"> ✓ Enhance scrutiny of legal drafting by the Cabinet of Ministers to improve the quality of legal acts and decrease the need for frequent amendments (SIGMA, 2018). 	Medium-term	Cabinet of Ministers

Source: UNECE.

Note: No achievements were identified for this sub-pillar.

Sub-pillar IV: Post-implementation

Ex-post evaluation is completed after the implementation of the action plan and based on results rather than forecasts. It helps establish the impact of policy activities on the industry in general, on specific fields or on beneficiaries. In light of experience acquired during implementation, governments introduce necessary adjustments to innovation policy measures so as to better target new or established policy objectives.

Ex-post evaluation

The Innovation Strategy states that its “monitoring procedure will be developed by the [MoES] together with the Ministry of Economic Development” and that these two ministries should conduct or order annual surveys of innovation stakeholders, in particular, enterprises and business associations, regarding their perceptions of changes of the innovation ecosystem. It contains no mention of impact assessments.

Broader policy issues

No general requirement exists in the Government’s legal framework for reporting on the implementation of sector strategies, so government bodies have no consistent practice of doing so (SIGMA, 2018). Overall, monitoring and evaluation is insufficient and overly

focused on outputs, with few systemic linkages to ensure that learning feeds into the policy design process, including in government bodies responsible for STI policy. The IPO analysis found limited evidence of any type of impact assessment of innovation policies across relevant ministries. For a detailed overview of the practices of monitoring and evaluating innovation policies and measures, see chapter IV.

Sub-pillar IV IPO evaluation and recommendations			
Area for improvement	Recommendation	Time frame	Responsibility
<ul style="list-style-type: none"> No culture of evaluation exists, resulting in a near absence of policy learning and a tolerance of failures. 	<ul style="list-style-type: none"> Make scientific support measures of policy programmes and/or evaluation by independent institutions mandatory and establish a central auditing authority (general accounting office). 	Long-term	MoES
<ul style="list-style-type: none"> Indications of how implementation of the Innovation Strategy will be monitored and evaluated are vague. 	<ul style="list-style-type: none"> Define precise monitoring practices in strategy action plans, as well as the content and responsibilities of the innovation stakeholder survey. 	Short-term	MoES National Council of Ukraine for Science and Technology Development
	<ul style="list-style-type: none"> Ensure that future strategies include the modalities for monitoring and evaluation from their outset. 		
<ul style="list-style-type: none"> Monitoring, evaluation and impact assessment practices are scarce in policymaking. 	<ul style="list-style-type: none"> Streamline and implement impact assessment mechanisms systematically to enhance the quality of the flow and stock of laws and policies. 	Medium-term	Cabinet of Ministers
	<ul style="list-style-type: none"> Adopt legislation that makes it mandatory to report on the implementation of sector strategies. 		
<ul style="list-style-type: none"> The rare monitoring and evaluation practices are of poor quality. 	<ul style="list-style-type: none"> Adopt more systemic linkages of monitoring and evaluation practices to policy design, including in government bodies responsible for STI policy. 	Medium-term	Cabinet of Ministers

Source: UNECE.

Notes

- Starting in the mid-2000s, the Ukrainian Institute of Scientific and Technical Expertise and Information (UkrI STEI) conducted foresight exercises to define priorities in science and technology. The State Programme for Forecasting Scientific and Technical Development for 2004–2006 financed the exercises, but during their implementation the programme's funding was suspended. In 2007, the Government adopted the State Programme for Forecasting Scientific and Technical Development for 2008–2012, which UkrI STEI was in charge of. Its experts analysed priority areas that included energy and energy efficiency, biotechnology and new materials, and ICT. The results informed the draft Law on Priority Directions of Innovation Activity in Ukraine, adopted in 2011.
- The complete list of working group members is available at <https://mon.gov.ua/ua/npa/pro-stvorennya-robochoyi-grupi-z-rozroblennya-strategiyi-innovacijnogo-rozvitku-ukrayini>.

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

The COVID-19 pandemic and the associated lockdown measures have significantly affected the economies and societies of all UNECE member States, including the six countries of Eastern Europe and the South Caucasus (EESC), causing a contraction of up to 8 per cent in real GDP in 2020.

UNECE supports closer cooperation among its 56 member States in the pursuit of the UN Sustainable Development Goals (SDGs) and the 2030 Agenda. Its Economic Cooperation and Trade Division (ECTD) assists member States with economic integration and in promoting and enabling a better policy, financial and regulatory environment.

To foster sustainable development, including progressing towards an increasingly circular economy and building resilience to events such as the COVID-19 pandemic, experimentation with ideas and technologies must become systematic across UNECE member States' economies and societies. The Innovative Policies Development Section within ECTD focuses on promoting a supportive environment for innovative development and knowledge-based competitiveness. Activities include policy dialogue, recommendations and good practices, analytical reviews, and capacity-building.

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