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**PROMOTING INNOVATION IN
CENTRAL ASIA – SHAPING NEW MARKETS**

UNECE background paper

This Background paper for the 2017 SPECA Economic Forum has been prepared by Mr. Rumen Dobrinsky, UNECE international expert and consultant. The views in the document are those of the author and do not necessarily express the position of the UNECE.

1. Introduction

In September 2015, United Nations member States adopted a set of goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. The ambitious Agenda for Sustainable Development 2030 covers 17 comprehensive and wide-ranging Sustainable Development Goals (SDGs) and contains 169 related targets.¹

The implementation of the Agenda requires the joint efforts of peoples, governments, organisations, businesses and civil society. It is expected that each country that signed up to the SDGs would adopt relevant national legislation and regulations and develop action plans and programmes backed by adequate resources targeting these ambitious goals. As many of the SDGs are of global nature, their pursuit requires cross-border cooperation and coordination at the international level.

Most SDGs are formulated in broad terms and have multiple dimensions that run across different layers of economic and societal life. Given their multifaceted nature, the pursuit of SDGs requires to employ complex multidisciplinary approaches, often in ways that have not been used until now. Indeed, targeting the SDGs calls for innovative policy and managerial approaches and wide-ranging innovation in the broad sense. Innovation per se is part and parcel of the SDGs and features prominently in Agenda for Sustainable Development 2030 (in particular, SDG 9) but implicitly it runs across the whole Agenda. Each and every SDG requires the advance of novel approaches and means to address the existing problems and pursue the respective goal.

All countries participating in the United Nations Special Programme for the Economies of Central Asia (SPECA) have signed up to Agenda for Sustainable Development 2030 and hence have joined to the worldwide efforts to achieve the SDGs by the year 2030. In consequence, both governments and societies of the SPECA countries have committed themselves to organise and implement comprehensive dedicated measures and actions and, respectively, to allocate the needed resources, targeting the SDGs.

The pursuit of SDGs in the SPECA subregion has both national and cross-border dimensions. Being geographically located in a specific territory, many SPECA countries face common or similar challenges both in terms of their socio-economic development and as regards the Agenda for Sustainable Development 2030. A number of SDGs to which the SPECA countries have committed themselves have cross-border dimensions and hence their pursuit would greatly benefit from joint efforts by these countries. This would ensure complementarity of the efforts and generate synergies thus significantly increasing the efficiency and effectiveness of the joint efforts.

As noted above, innovation would certainly need to feature prominently also in the efforts of the SPECA countries to achieve the SDGs. Moreover, both national and cross-border efforts would need to embed innovative approaches in order to be effective in the pursuit of the goals. As this may not necessarily happen on its own, governments and societies in the SPECA countries would need to make the needed preparatory efforts and measures to pave the way for actual action.

This paper is an attempt to address some of the issues outlined above in the context of the SPECA subregion. It first looks at the actual situation with SDGs in the SPECA countries: where they stand with the respect to the goals at present; which are their main challenges and which are their key priorities. Subsequently, the paper presents a brief conceptual overview of the possible role innovation can play as a driver of sustainable development and hence a vehicle in the pursuit of the SDGs. Based on this analysis and its conclusions, the paper puts together some basic guiding principles for formulating an innovation-based policy agenda in the pursuit

¹ After subsequent discussions, the final list of sustainable development indicators was extended to include 230 indicators.

of SDGs in the SPECA countries and outlines the main features and characteristics of the respective policy approach. Finally, the paper presents some concrete policy recommendations for the SPECA countries reflecting policy options of highest priority and those that are likely to be most effective, bringing fast results with least resource inputs.

The paper aims to stimulate a wide policy debate among governments and all relevant stakeholders in the SPECA countries on innovative ways and means of implementing the Agenda for Sustainable Development 2030 and on the invigoration of cross-border cooperation in the SPECA subregion in the pursuit of the SDGs.

2. An overview of the SDG challenge facing the SPECA subregion

Measuring progress towards SDGs is in itself a challenge given the multidimensional nature of most of these goals. For this purpose, Agenda 2030 included also a list of 169 concrete targets, most of them of quantitative nature, which should allow monitoring progress in implementation and advance towards achieving the goals. Subsequently, for practical purposes, the SDG targets were translated into 230 Sustainable Development Goal indicators within the newly designed global indicator framework that was developed by the UN Inter-Agency and Expert Group on SDG Indicators.² All 230 SDG indicators are quantitatively measurable which should allow accurate and methodologically consistent data collection for individual countries as well as subsequent aggregation by subregions and regions as well as at the global level.

Practical work on data collection and monitoring progress towards the SDGs is still in its initial phases but the UN secretariat already started compiling regular reports on progress towards the Sustainable Development Goals. The first such report, prepared in 2017, is still partial and covers only a selection of indicators for which data were available at the time of its compilation.³ Nevertheless, it offers a rough snapshot of the current situation with respect to the 17 SDGs by providing an overview of progress towards these goals both at the global and regional levels.

Countries committed to Agenda 2030 are expected to build their own monitoring systems by compiling on a regular basis statistics on the 230 SDG indicators. However, this task is resource demanding and its implementation will take time, especially in less developed countries. At present, no SPECA country has established such monitoring systems and hence comparable relevant data from national sources are not available. For this reason, we illustrate the current progress of the SPECA countries on the basis of selected data from the UN report “Progress towards the Sustainable Development Goals”. As the report does not contain a regional aggregate for the SPECA countries we use as a proxy the regional aggregate Central Asia (Table 1).⁴

² Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators (E/CN.3/2016/2/Rev.1)

³ Progress towards the Sustainable Development Goals. Report of the Secretary-General. UN document E/2017/66, 11 May 2017.

⁴ According to UN statistical practice, the region Central Asia includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. SPECA countries Afghanistan and Azerbaijan are not included in this aggregate.

Table 1. Selected SDG Indicators in Central Asia and Europe, averages, 2000-2016

SDG Indicator		Central Asia				Europe			
		2000	2005	2010	2016	2000	2005	2010	2016
1.1.1	Proportion of employed population below the international poverty line of US\$1.90 per day, both sexes	27.1	15.7	5.9	3.2	0.5	0.4	0.4	0.3
2.1.1	Prevalence of undernourishment (%)	14.5	12.9	9.8	7.7	5.0	5.0	5.0	5.0
3.2.1	Under-five mortality rate (per 1000 live births)	64.4	51.0	40.5	32.9	11.7	9.0	7.1	6.1
3.3.2	Estimated incidence of tuberculosis (per 100 ths. population)	155	160	118	88	54	52	40	32
3.4.1	Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease (between age 30 and 70, %)	34.6	35.4	32.0	27.7	23.3	22.3	19.0	17.4
3.6.1	Death rate due to road traffic injuries (per 100 ths. population)	12.9	19.4	17.8	16.9	14.1	13.8	9.9	8.7
4.2.2	Adjusted net enrolment rate (%)	..	68.4	73.0	78.5	92.0	90.8	93.9	94.6
5.5.1	Proportion of seats held by women in national parliaments (%)	7.0	13.4	20.0	21.3	16.8	20.5	23.2	28.0
6.1.1	Proportion of population using improved drinking water sources (%)	83.5	83.8	86.6	86.8	97.8	98.3	98.7	99.0
7.1.1	Proportion of population with access to electricity (%)	99.4	99.7	99.8	100.0	99.7	99.9	100.0	100.0
7.2.1	Renewable energy share in the total final energy consumption (%)	3.9	3.8	3.6	3.7	7.4	8.1	11.0	13.1
7.3.1	Energy efficiency (energy intensity level of primary energy, megajoules per constant PPP GDP)	17.3	13.2	10.8	9.1	6.0	5.5	5.1	4.6
9.4.1	CO2 emission per unit GDP (Kg of CO2 per constant 2010 USD GDP PPP)	1.11	0.88	0.75	0.60	0.33	0.30	0.27	0.23
9.5.1	R&D expenditure as a proportion of GDP (%)	0.18	0.25	0.16	0.18	1.62	1.60	1.75	1.83
9.5.2	Researchers (in full-time equivalent) per million inhabitants	337.4	363.2	391.2	500.0	2458.0	2730.3	2985.7	3181.1
9.c.1	Proportion of the population covered by at least a 2G mobile network (%)	30.0	60.2	86.7	97.5	94.3	98.5	98.3	97.2

Source : Progress towards the Sustainable Development Goals. Report of the Secretary-General, Supplementary Information. Statistical Annex: Global and regional data for Sustainable Development Goal Indicators, 2017 session, 28 July 2016-27 July 2017, Agenda items 5, 6 and 18 (a) (UN document E/2017/66)

Table 2. Sustainable Development Goals Dashboards for the SPECA countries

	Sustainable development goals	Afghanistan	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenista n	Uzbekista n
1	End poverty							
2	Food security, sustainable agriculture							
3	Healthy lives and wellbeing							
4	Inclusive education, lifelong learning							
5	Gender equality, women empowerment							
6	Sustainable water and sanitation							
7	Sustainable and modern energy							
8	Inclusive and sustainable growth, full employment							
9	Sustainable infrastructure and industrialisation, innovation							
10	Reduce inequality within and among countries							
11	Smart and sustainable cities							
12	Sustainable consumption and production							
13	Combat climate change and its impacts							
14	Sustainable use of oceans, seas and marine resources	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
15	Sustainable use of ecosystems and forests							
16	Peaceful, inclusive societies for sustainable development							
17	Global partnership for sustainable development							

Note :

	all the indicators under the goal are rated green (met)
	increasing ...
	distance
	from achievement

Source: SDG Index and Dashboards Report 2017, Bertelsmann Stiftung and Sustainable Development Solutions Network.

For benchmarking purposes Table 1 also contains aggregates for Europe. Such a comparison allows assessing the relative standing of Central Asia (the SPECA subregion) vis-à-vis a more developed part of the world and identifying some of the largest gaps in the progress towards the SDGs.

Another source of information on the SDG performance and achievements of individual countries is the SDG Index and Dashboards Report prepared by non-governmental bodies.⁵ In accordance with its self-proclaimed objectives, this report synthesizes metrics with available data (based whenever possible on the official SDG indicators) to enable countries to take stock of where they stand with regards to fulfilling the SDGs and help them set priorities for action. The SDG Index and Dashboards are therefore not official SDG monitoring tools and are subject to some limitations and caveats (such as the need to use proxies for missing data). Nevertheless, the advantage is that this report presents estimates (albeit rough) on SDG performance and achievements for almost all countries in the world vis-à-vis virtually all SDGs.

Table 2 reproduces the SDG Dashboards for the SPECA countries as presented in the most recent (2017) SDG Index and Dashboards Report.

Although the available data are rather patchy, they tend to suggest three main characteristics of the situation with SDGs in the SPECA subregion:

1) At present, the SPECA countries face, albeit to a different degree, significant challenges in achieving the SDGs; in many cases, there are considerable gaps in the degree of achievement and hence they have to cover a large distance to the desired targets.

2) On average, SPECA countries still lag considerably behind more developed regions such as Europe taken as a whole and hence face a greater challenge in compliance;

3) On the other hand, during the period 2000-2016 the Central Asian countries have made considerable progress in most SDG indicators, thereby advancing fast towards better SDG scores and reducing existing lags. In comparison, during the same period there has been considerably lower dynamics in the degrees of SDG attainment by the more developed region of Europe.

These data as well as other data contained in the Report on progress towards the Sustainable Development Goals and the SDG Index and Dashboards Report make it possible to draw some general, albeit rough, conclusions on the existing gaps in SGD attainment in the SPECA subregion. In particular, one can deduce that for the subregion as a whole, the SDGs with largest lags are: SDG3, SGD6, SDG8, SDG9, SDG11 and SDG16.⁶ These SDGs also outline the areas where local policy makers will likely face the greatest challenges in meeting the sustainable development goals and targets. Respectively, these policy areas would require the greatest efforts and resource allocations if SPECA countries are to deliver on their SDG commitments.

Apart from the formal quantitative assessment of the progress towards the SDGs, when assessing the challenge faced by SPECA countries, one needs to take into account the specificity of the local context and the policy priorities of individual countries and groups of countries. The present paper relies for this purpose on an expert assessment of the work on achieving the SDGs in the national frameworks of the SPECA countries and the areas in which collaboration within the framework of SPECA could be beneficial for pursuing the SDGs.⁷

⁵ *SDG Index and Dashboards Report 2017*, Bertelsmann Stiftung and Sustainable Development Solutions Network.

⁶ See table 2 for the full list of Sustainable Development Goals.

⁷ Report on the Preparations for the Implementation of the Sustainable Development Goals in the SPECA Subregion. Report by Aida Alzhanova, UNECE Consultant, March 2017.

Table 3. Sustainable Development Goals identified as national priorities by the SPECA countries

	Sustainable development goals	SDGs identified as national priority							Number of countries
		Afghanistan	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	
1	End poverty								0
2	Food security, sustainable agriculture	X							1
3	Healthy lives and wellbeing					X			1
4	Inclusive education, lifelong learning	X	X	X		X			4
5	Gender equality, women empowerment		X	X	X	X			4
6	Sustainable water and sanitation	X	X	X	X	X	X	X	7
7	Sustainable and modern energy	X		X	X	X		X	5
8	Inclusive and sustainable growth, full employment	X	X		X	X			5
9	Sustainable infrastructure and industrialisation, innovation	X	X	X	X		X	X	6
10	Reduce inequality within and among countries				X	X			2
11	Smart and sustainable cities								0
12	Sustainable consumption and production		X		X	X			3
13	Combat climate change and its impacts	X	X	X	X		X	X	6
14	Sustainable use of oceans, seas and marine resources		X	X			X		3
15	Sustainable use of ecosystems and forests				X		X	X	3
16	Peaceful, inclusive societies for sustainable development		X			X			2
17	Global partnership for sustainable development	X	X	X	X	X			4

Source: Report on the Preparations for the Implementation of the Sustainable Development Goals in the SPECA Subregion. Report by Aida Alzhanova, UNECE Consultant, March 2017.

The Agenda for Sustainable Development 2030 features prominently in the policy agenda in the SPECA subregion. Following the adoption of the SDGs, virtually all SPECA countries adopted national strategies or programmes for sustainable development and in most cases they aligned their national objectives with those of Agenda 2030. Understandably, the local context in each country has a bearing on the national sustainable development objectives. Nevertheless, the 17 SDGs are part and parcel of the strategic policy objectives in the whole SPECA subregion.

Table 3 presents a summary of the way the SDGs are reflected in national sustainable development strategies and programmes as well as in other policy documents in the SPECA countries on the basis of the Report on the Preparations for the Implementation of the Sustainable Development Goals in the SPECA Subregion.

Despite the differences in revealed policy priorities across countries, this table makes it possible to draw some conclusions on common patterns across different countries. In particular, judging from the frequency of occurrence of the respective SDGs as national priority in the SPECA countries (the rightmost column in Table 3) it is possible to identify SDGs that can be considered as priorities for the subregion as a whole based on the self-assessment by local experts and policy makers. Thus one can deduce that for the subregion as a whole the following SDGs are of high priority: SDG4, SDG5, SDG6, SDG7, SDG8, SDG9, SDG13, SDG17.

As a next step, we juxtapose the SDGs with largest achievement gaps as identified above with those that are identified as high priority by local policy makers (Table 4).

Table 4. SDG gaps and SDG policy priorities in the SPECA subregion

SDG gap faced by SPECA countries		
Priority assigned to SDGs by national policy in the SPECA countries	Large gap	Low or medium gap
High priority	SDG6, SDG8, SDG9	SDG4, SDG5, SDG7, SDG13, SDG17
Low or medium priority	SDG3, SDG11, SDG16	SDG1, SDG2, SDG10, SDG12, SDG14, SDG15

Source: Author's compilation

Such a presentation makes it possible to classify the SDG challenge facing the SPECA subregion into four categories

- SDGs with large lags which are identified as high priority by the SPECA countries (SDG6, SDG8, SDG9)
- SDGs with smaller or medium lags which are identified as high priority by the SPECA countries (SDG4, SDG5, SDG7, SDG13, SDG17)
- SDGs with large lags which are not considered high priority by the SPECA countries (SDG3, SDG11, SDG16)

- SDGs with smaller or medium lags which are which are not considered high priority by the SPECA countries (SDG1, SDG2, SDG10, SDG12, SDG14, SDG15)

Obviously, the policy areas covered by the first two groups will be those where SPECA countries intend to allocate most efforts and resources in implementing their sustainable development agenda. Respectively, these can also be considered as the areas where collaboration among the SPECA countries in addressing problems and objectives of common interest could be most successful in generating synergies and complementarities.

3. Innovation as a driver of development and sustainable development

3.1 Innovation for development

While innovation is a broad concept, it is usually associated with the successful commercial application of knowledge in the form of new products or services.⁸ Innovation may be the outcome of different undertakings and some new products or services can be interpreted differently in a different context. Thus a product which already exists in one market (and therefore is not an innovation) can be considered as an innovation if was introduced in a market in which it was not present before. Importing a new to the market technology from abroad or introducing a new organizational model in a firm which imitates existing managerial models in established firms are also innovation in such a context. In countries which are lagging behind both in their economic and in their technological development such as many of the SPECA countries, there can be a vibrant innovative process based on imitation and adaptation and the introduction of new to the local market products, services and technologies.

There is a particular strand in the innovation literature dedicated to the role of innovation in developing and/or emerging economies.⁹ The analysis of the specificities of the innovation process in such environments has given rise to the notion of “innovation for development” to denote innovation-based initiatives that at the same time address development issues.¹⁰ Analysts point to some specific challenges that innovators faces in such environments:

- The overall economic and institutional environment in emerging and developing countries may be problematic and unsupportive to doing business;
- Domestic markets in such economies tend to be small, so that it may be difficult to realize economies of scale on the local markets;
- The business sector in these countries is usually dominated by low-tech SMEs and microenterprises, many of which operate in the informal sector of the economy; due to this economic structure, the general technological capability of the economy is also low;

⁸ The OECD defines four main types of innovation: product innovation; process innovation; marketing innovation and organisational innovation. OECD, Guidelines for Collecting and Innovation Data (Oslo Manual), 3rd edition. Paris: Organisation for Economic Co-operation and Development, 2005.

⁹ See, among other, Jean-Eric Aubert, Promoting Innovation in Developing Countries: A Conceptual Framework, World Bank Policy Research Working Paper 3554, April 2005 (<https://openknowledge.worldbank.org/bitstream/handle/10986/8965/wps3554.pdf?sequence=1>); Yoslan Nur, Rethinking the Innovation Approach in Developing Countries, WTR (World Technopolis Association) 2012; Manuel Trajtenberg, Innovation Policy for Development: An Overview, Paper presented at the Second LAEBA Annual Meeting, Buenos Aires, Argentina – November 28-29, 2005 (<http://www.tau.ac.il/~manuel/pdfs/Innovation%20Policy%20for%20development.pdf>).

¹⁰ See Innovation for Development. A Discussion of the Issues and an Overview of Work of the OECD Directorate for Science, Technology and Industry, OECD, May 2012; Charles Edquist, op. cit.

- Accordingly, the innovation systems in emerging economies are underdeveloped (lacking important building blocks) and fragmented (featuring low connectivity and poor/weak linkages);
- This environment predetermines suboptimal conditions for undertaking some forms of innovation (in particular, technological innovation);
- While financing constitutes a constraint to innovation in all countries, it is especially acute in emerging and developing economies as potential innovators in these economies have a very limited ability to bear risk (due to low personal incomes, low savings, underdeveloped financial markets);
- Mirroring the high uncertainties in the business environment, planning horizons tend to be rather short in such economies; this refers both to the motivation of entrepreneurs to undertake longer-term projects and the supply of finance to back such projects.

At the same time, the literature also highlights the existence of specific opportunities for innovators in emerging and developing economies:

- While the existing gap from the technology frontier is a challenge, it also offers opportunities for catch-up and productivity growth on the basis of technology transfer;
- The weak economic and institutional environment is not an obstacle for some forms of innovation, in particular, those based on adaptation and imitation;
- Learning and the local diffusion of knowledge play a crucial role for the proliferation of this type of innovation in emerging and developing economies;
- There is also untapped potential in promoting and developing grassroots innovation in these countries; grassroots innovation can offer win-win solutions both for development and economic growth and for addressing local needs and problems;¹¹
- The agricultural sector, which weighs considerably in most developing economies, opens specific opportunities for innovation for development, especially those based on the introduction of new technologies;
- There is also considerable room for managerial and organizational innovations which are not resource demanding.¹²

Innovation based on adaptation (mostly through technological imports) can help address some of the challenges that innovators face in lower income countries and mitigate some of the associated risks, in particular, for innovation which has already been proven abroad. In this case the time horizon is also much shorter compared to an invention as some of the essential phases of the innovation process can be just skipped. The financing requirements may be lower given that there is less need for R&D, and given that the innovation may be embodied in a piece of imported machinery. Related to that, there is less need for early stage innovation financing thanks to the lower risk and the possibility to use the imported technology as collateral.

There are important policy implications of the recognition of the specific features of “innovation for development” and the need to adhere to the broad understanding of innovation in the local context of emerging and developing economies. Among them are the following:

- Innovation for development can generate a multitude of positive socio-economic outcomes, contributing to growth, skills formation and economic diversification;
- Innovation for development policies should target the formation of specific innovation capabilities, in particular those applicable to imitation and adaptation;

¹¹ Yoslan Nur, op.cit.

¹² Caroline Paunov, *Innovation and Inclusive Development: A Discussion of the Main Policy Issues*, OECD Science, Technology and Industry Working Papers, 2013/01, OECD Publishing (<http://dx.doi.org/10.1787/5k4dd1rvsnjj-en>)

- Related to that, policies need to prioritize the promotion of technology diffusion, adoption and adaptation in the specific local context and environment;
- The promotion of knowledge and technology diffusion can be pursued with different policy instrument such as metrology, standards and quality control, extension services, information and training programs, demonstration and pilot projects;¹³
- The specialization of the economy, even if narrow, can also be regarded as an opportunity as it prompts some natural points of departure for innovative ventures that build on the already established economic sectors;
- As some of the most promising and successful innovation practices (such as grassroots innovation) are local, policy support should also be localized in order to be more effective; promoting the demand for local innovation can play a key role in this;
- Good practices in different countries suggest that successful innovation for development policies tend to be bottom up and not top down; hence what is needed is an enabling environment and incentives for the local innovative entrepreneurs;
- Given the inherent resource constraints (in terms of finance and capability), innovation for development policies should be prioritized and pursued a gradual manner.

3.2 Innovation in the 21st century

Innovation in general is a highly complex process, involving the interactions of a whole range of innovation stakeholders: innovative entrepreneurs, academic and R&D institutions, the business sector as source and target of innovation, innovation intermediaries and support institutions, public bodies with responsibilities to support innovation, financial institutions, national policies in the area of innovation, the framework conditions for innovation, the consumers (more generally, the market for innovation), etc. The innovation actors and their interactions form what is usually referred to as the “innovation ecosystem”.

The key player in the innovation process is the innovative entrepreneur, the person who not only generates the idea (or invention) but then pushes it forward all along the difficult road to the market, a journey within which the idea is transformed into a new product or service. The entrepreneur cannot go it alone; in the process, he needs to interact and collaborate with many actors and stakeholders in the innovation ecosystem.

Cooperation among stakeholders (e.g. between industry and science, between small and large firms, between foreign and domestic firms, etc.) is an important feature of modern innovation. Lack of, or insufficient collaboration between innovation stakeholders is considered as a systemic failure that needs to be addressed by policy intervention. A number of modern innovation policy instruments target specifically the breeding of cooperation among actors in the innovation process.

On the other hand, the reluctance of some stakeholders to engage in cooperation with others may be well justified if the economic and business environment does not help to dissipate their existing concerns. These concerns may be related to poor protection of property rights (in particular, intellectual property rights), weak contract enforcement, uncertain and unpredictable business and regulatory environment as well as other risks related to the joint implementation of cooperative efforts and ventures.

Finance is another central component of the innovation process. The process of transforming the idea to a marketable product or service is not only long and risky but also costly. Many innovative ventures fail to make it due to the drying up of vital financial resources. Moreover, due to the high risk, most of the conventional financial institutions never engage in financing innovation. Successful innovation is conditional on the existence of very specific

¹³ Jean-Eric Aubert, op.cit.

financial institutions (such as business angels, venture capital firms but also specialized public funds) which are willing to absorb the risk of early stage financing. The lack of such institutions – which effectively thwarts a vibrant innovation process – may reflect either an immature market environment or market and/or systemic failures. In both situations there is a case and rationale for policy intervention to address these problems.

The notion of innovation is a living concept which constantly evolves and broadens to reflect the changing reality by covering new forms of business and social relations and interactions that give rise to novel outcomes. While the 20th century was dominated by the notion of business innovation and its Schumpeterian interpretation, the last couple of decades have witnessed the proliferation of numerous new forms of innovation which, in turn, calls for the reconsideration of some established notions and concepts (Table 5).

Most notably, in a radical departure from the established view that the ultimate objective of any innovation is to generate profit for the entrepreneur by selling new goods and services on the market, some of the new forms of innovation such as public sector innovation or social innovation usually aim to generate public goods that serve societal needs bypassing the market.

The nature of business innovation itself is constantly changing. While traditionally innovation is usually centred around a closely guarded piece of knowledge protected by patents and trade secret with a view to cashing in all the profit, one specific new strand of business innovation, open innovation, relies on knowledge sharing among innovation partners while at the same time may offer them opportunities to share in the profit. Co-creation is a similar pattern of innovation in which innovative entrepreneurs engage innovation partners in a joint venture. In turn, grassroots innovation – which usually refers to bottom-up initiatives of local stakeholders that seek novel solutions to (mostly local) social challenges or development issues – may combine elements of social and business innovation.

Eco-innovation, which has a key role in sustainable development as its objectives inherently include ecological improvements, is also a form of business innovation which is governed by specific mechanisms and interactions. Eco-innovation helps reduce the negative impacts on the environment or contributes to a more efficient/ responsible use of resources which ultimately reduces environmental risk and hazards, such as pollution and other negative impacts of resources use. “Mission-oriented innovation” refers to another brand of innovative ventures which are directed towards the achievement of specific technological goals, or which seeks to address specific social challenges (for more details see section 3.4).

As indicated in Table 5, the different forms of innovation may differ in their objectives and rationale, may target different markets or societal segments; and may rely on different forms of funding. Thus, newly emerging forms of innovation have given rise to new forms of innovation finance such as crowdfunding; impact investment is also such a new form of innovation finance. Accordingly, the motivation and incentives of innovative entrepreneurs in the new varieties of innovation are also different from those of traditional business entrepreneurs.

When assessing the role of innovation in Agenda 2030 it is necessary to take into account all varieties of innovation in the modern economy and the dynamic nature of the notion itself.

Table 5. Innovation in the 21st century: a continuously broadening concept

Forms of innovation	Rationale; objectives	Target market /segments	Entrepreneur	Funding
Business innovation (product; process; organisational; marketing)	New products and services sold on the market and generating profit for the entrepreneur	Consumers; Businesses	Business entrepreneur	Early stage: public and private Mature: market
Open innovation/Co-creation (specific business innovation)	New products and services developed through knowledge sharing with opportunities for profit sharing	Consumers; Businesses	Business entrepreneur and innovation partners	Early stage: public and private Mature: market
Eco-innovation (specific business innovation)	New products and services generating profit and contributing to direct or indirect ecological improvements	Consumers; Businesses	Business entrepreneur	Early stage: public and private Mature: public and market; impact investing
Mission-oriented innovation (driven by an “entrepreneurial state”)	Achievement of specific technological goals (mission-oriented) or addressing social challenges (challenge-led)	Large-scale projects or challenges	PPPs steered by an “entrepreneurial state”	Predominantly public
Public sector innovation	Improvements in public administration; Better/more efficient public services	Broad public	Entrepreneurial public servants	Public; more efficient use of public funds
Smart specialisation (specific policy approach involving business and public sector)	Jointly agreed policies and activities helping and enabling regions to focus on their strengths	The regional economy	Business and public sector entrepreneurs	Public and private; Impact investing
Social innovation (innovations with a social purpose)	A novel bottom-up solution to a social problem that is more effective, efficient, sustainable, or just than current solutions	Society; Local communities	Social entrepreneur	Crowdfunding; microcredit; Public and private
Grassroots innovation (bottom-up initiatives of local stakeholders)	Novel solutions to local social or developmental challenges	Local communities	Local stakeholders	Crowdfunding; microcredit; Public and private

Source: Author’s compilation

3.3 Innovation policies for sustainable development

Conceptually, the notion of sustainable development implies the harmonious symbiosis of its three intertwined ingredients: economic, social and environmental. Sustainable development is a complex and multidimensional objective which requires broad-based efforts by national governments and the international community to ensure that progress is made in parallel on all fronts of this agenda, respectively, on all 17 MDGs and their 169 targets. Prioritization may be necessary in cases when there are visible gaps vis-à-vis some goals and targets, as may be the case for some SPECA countries. In this case governments may need to allocate greater efforts and amounts of resources onto the lagging fronts in Agenda 2030.

Innovation in the broad sense, as discussed above, can and should be a key driver for implementing this ambitious agenda. Indeed, given the novelty of this broad set of intertwined goals and targets, their pursuit requires novel, innovative approaches and solutions and the formation of new innovative capacity to address such challenges in a coherent and coordinated manner. Thus innovation should run across the whole Agenda 2030, as well as its goals and targets.

If we juxtapose this wide-ranging agenda with the broader understanding of innovation as presented in the previous section, it is clear that there is a truly wide scope for innovative ventures and initiatives in pursuing the SDGs.

Table 6 presents a simplified picture of the key aspects of Agenda 2030 where innovation could be regarded as a key driver for achieving the SDGs and targets:

While the potential role of innovation for advancing sustainable development in all its aspects is undisputable, what is less straightforward is how to make this happen in reality? What is clear though is that the possible clues to these challenges need to be sought for in the policy domain, more specifically, that of innovation policy. However, the conventional rationale and objectives of innovation policy do not necessarily address all aspects of the SDGs and targets. Hence, what is needed is a certain reorientation and redefinition of the policy focus and the mobilisation of all key stakeholders towards new common goals stemming from the sustainable development agenda. Such a reorientation of the policy focus would make it possible to steer innovation efforts and investments into areas critical for sustainable development, and to encourage the rapid and broad-based adoption and diffusion of innovations in such fields.¹⁴

One of the traditional rationales for policy intervention in support of innovation is to address market failures and correct for market distortions that impede innovation efforts, in particular, by internalizing existing externalities. Agenda 2030 encompasses a range of goals and targets such as those in the environmental domain that would be difficult to achieve without correcting for existing market distortions and failures. Cases in point include energy efficiency in buildings and transport, the move towards renewable energy, sustainable cities and the move to the circular economy, to name but a few. Without policy interventions which actively steer innovation efforts into areas critical for sustainable development, progress may not occur because innovation in sustainable technologies and products may not advance more rapidly than innovation in conventional technologies and products.¹⁵ There exist many well-known and widely applied policy instruments to address market failures and distortions and to internalize existing externalities.¹⁶

¹⁴ UNECE, *Innovation for Sustainable Development Review of Belarus*, New York and Geneva, 2016

¹⁵ UNECE, *ibid.*

¹⁶ See Dobrinsky, R., "The Paradigm of Knowledge-Oriented Industrial Policy", *Journal of Industry, Competition and Trade* 9(4), 2009, pp. 273-305.

Table 6. Forms of innovation to address the SDG challenges and priorities in the SPECA countries

	Sustainable development goals	Forms of innovation					
		Business innovation/ open innovation	Eco-innovation	Mission-oriented innovation	Public sector innovation	Smart specialisation	Social innovation/ grassroots innovation
1	End poverty	X			X		X
2	Food security, sustainable agriculture	X	X	X			
3	Healthy lives and wellbeing		X	X	X	X	X
4	Inclusive education, lifelong learning				X		X
5	Gender equality, women empowerment				X		X
6	Sustainable water and sanitation	X	X	X			
7	Sustainable and modern energy	X	X	X			
8	Inclusive and sustainable growth, full employment	X			X	X	X
9	Sustainable infrastructure and industrialisation, innovation	X		X			
10	Reduce inequality within and among countries				X	X	X
11	Smart and sustainable cities			X	X	X	X
12	Sustainable consumption and production	X	X			X	X
13	Combat climate change and its impacts		X	X			
14	Sustainable use of oceans, seas and marine resources		X	X			
15	Sustainable use of ecosystems and forests		X	X			X
16	Peaceful, inclusive societies for sustainable development				X	X	X
17	Global partnership for sustainable development	X	X	X	X		

Source: Author's compilation

Furthermore, modern innovation policy, based on the understanding that innovation is a systemic process which takes place in a complex innovation system, seeks to address not only market failures (which is the traditional rationale for policy intervention) but also “failures” in the innovation system itself, such as:¹⁷

- Failures in social institutions amounting to their inability to perform efficiently their functions;
- Network failures, which have to do with problems in the interaction among different innovation stakeholders;
- Capability failures in firms and other stakeholders, which come to their inability to act in their own best interests;
- Framework failures, related to difficulties in the broad framework conditions for the smooth progression of the innovation process.

Extending this conceptual framework to the Agenda for Sustainable Development 2030, one could claim that there is a new role for modern innovation policy, namely, to address “sustainability failures” which relate to obstacles of various nature that inhibit societies and economies to innovate in areas that are critical for sustainable development or in areas that address simultaneously the economic, social and environmental objectives as set in Agenda 2030. The recognition of possible sustainability failures requires a multidisciplinary, cross-sectoral approach to the individual SDGs and targets with a view to mapping the implied innovation process and identifying existing bottlenecks that block or impede such innovations. As a next step, possible remedies may be considered in the form of targeted policy interventions correcting for the identified sustainability failures.

Furthermore, innovation policy considers innovation as a process involving many stakeholders and emphasizes the importance of interaction and technological cooperation among stakeholders and the access to new knowledge through collaborative networks. Due to the existence of sustainability failures, stakeholders of some sustainability goals may have different or conflicting interests which prevent them from joining forces to address sustainability issues. In this case, a specific policy intervention may be needed to align the interests of different/heterogeneous innovation stakeholders and stimulate their collaboration in pursuing the specific goals and targets.

The rationale for such interventions would be to address existing coordination externalities among innovation stakeholders and help in engineering new projects addressing sustainable development goals that would not have been in place in the absence of the public intervention. Reaching a mutually satisfactory agreement on sharing the risks of the venture is the basis for mobilizing private sector participation in the project. Such interventions may not even include a financing component but would rather rely on the convening power of the state to bring together different innovation stakeholder and engage them in a dialogue.¹⁸

In this regard, stakeholder partnerships targeting innovation are efficient mechanisms to address such issues by helping overcome barriers such as project scale and cost, dispersed expertise, and technical and commercial risk, among others, and ultimately to generate incremental social welfare effects. The key drivers for constituting such innovation partnerships are:¹⁹

- The demand for new technologies that require collective action, particularly in the case of high-spillover goods, where technology advances generates benefits beyond those that can be captured by innovating firms;

¹⁷ For details see Arnold, E. and Thuriaux, B., “Introduction,” in: European Commission, Future directions of innovation policy in Europe, Innovation Papers No. 31, pp. 1-9, 2003.

¹⁸ Dobrinsky, R., *ibid.*.

¹⁹ See Wessner, C. (ed.) (2003), *Government-Industry Partnerships for the Development of New Technologies*. The National Academies Press, Washington, D.C.

- The need for investment in combinations of technologies that may remain unexploited in companies or industries in the absence of coordination;
- The societal demand for socially beneficial R&D which would not be undertaken in the absence of a partnership;
- Widespread demand for new technologies or products resulting in a situation when the scope of the market is larger than the capacity of single, separate firms to capture it;
- The potential for a “public good” effect of the new technology, which can be beneficial to many firms (and not detrimental to any of them) and to the society as a whole.

The Agenda for Sustainable Development 2030 has clearly identified and recognized the role of partnerships in addressing SDGs and actually SDG17 makes a direct reference to this aspect. However, it is important to point out that apart from global partnerships which are the focus of SDG17 there is a notable role for stakeholder partnership at the subnational and national as well as across borders, within regions and subregions of the global economy such as the SPECA subregion.

Another policy aspect concerns the demand for innovative products and services targeting sustainable development. Even if all obstacles mentioned above have been overcome with the support of policy interventions, such innovations may not be undertaken for lack of demand for the resulting products. Demand may be absent or low for various reasons including lack of awareness of the superior characteristics (in addressing sustainability issues) of the new product or service, price considerations, usage costs, etc. Policy interventions stimulating demand can help in overcoming this obstacle by making the new product more attractive to customers. Such policies may include new standards and technical regulations, public procurement requirements; fiscal incentives to customers, etc.

3.4 The SDGs as an agenda for creating new markets: the policy challenge

Agenda 2030 is in itself a grand challenge for national policy makers and for the international community as a whole as it implies an overhaul and transformation of the national and global economic landscape. Addressing some of these challenges may necessitate the formulation of what is called “mission-oriented” policies – systemic public policies that draw on frontier knowledge to attain important technological or social goals.²⁰

The term “mission-oriented” stresses the fact that such policies aim to achieve specific objectives. Respectively, the term “mission-oriented innovation” refers to innovation which is directed towards the achievement of such technological goals, or which seek to address the respective social challenges²¹ and hence can exert a transforming effect on the patterns of production and consumption patterns within and across sectors. From this perspective, it is sometimes claimed that the focus of such policies shifts from market fixing (correcting for market failures) to market-creating or market shaping which transforms the economic landscape.²²

Mission-oriented innovation policies differ from mainstream innovation policy in one specific aspect, namely that they are mostly of “vertical” nature, prescribing the direction of the desired change while most innovation policy instruments are of “horizontal” nature which do not point to a specific direction. For this reason, mission-oriented innovation policies are closer in spirit to what is usually referred to as “industrial policy”. Industrial policy itself has had ups

²⁰ Mazzucato, M. (2017), *Mission-Oriented Innovation Policy. Challenges and Opportunities*, UCL Institute for Innovation and Public Purpose, September 2017.

²¹ UNCTAD (2017), *New Innovation Approaches to Support the Implementation of the Sustainable Development Goals*, New York and Geneva.

²² Mazzucato, M. (2016), “From market fixing to market-creating: a new framework for innovation policy”, *Industry and Innovation*, Vol. 23, No. 2, pp. 140-156

and downs and has undergone a significant evolution over time, changing its approaches and instruments; modern innovation policy can be regarded as a descendant of this evolution.²³ More traditional vertical industrial policy (usually associated with a “picking the winners” approach) is nowadays only applied in large-scale technological (e.g. in space exploration) or military projects.

Most of the SDGs as formulated in Agenda 2030 do represent such “missions” that the signatory nations and the international community as a whole have taken upon themselves to achieve in the not too distant future. Plus, many of the SDGs actually represent challenges of a “grand nature” and hence applying vertical mission-oriented policies can in principle provide a suitable policy framework for addressing them and, in particular, for spurring mission-oriented innovation targeting the SDGs.

There are however a number of prerequisites for this to happen. In the first place this concerns the driving engine of the mission-oriented innovation process.

Traditionally, vertical industrial policies have been implemented with the predominant use of supply side instruments and the direct involvement of public finance, investment and management in the innovation process. Grand technological innovations such as those aimed at space exploration are examples of this policy approach. Subsidizing national “champions” with the expectation that they will pull the rest of the economy towards the desired goals is another example. However, supply side policies have their limitations and weaknesses. In the first place, they do require the allocation of large scale public resources (both financial and human) to such projects. Second, these policy approaches do not guarantee allocative efficiency and may induce market distortions. And thirdly, supply side instruments alone are just unsuitable for most types of innovation as described in the previous section, in particular those that respond to societal and social challenges, as they are unfit of spurring or sustaining the respective innovation process.

Considering the nature of the SDGs, addressing some of them with mission-oriented innovation policies might require the application of a wide variety of policy instruments, including demand-side innovation policy instruments as described in the previous section. In particular, public procurement for innovation (when a public organization places orders specifying the mission outcome as the fulfilment of certain functions that contribute to addressing societal problems) can be considered as a relevant demand-side and mission-oriented policy instrument in the mitigation of grand challenges such as the SDGs.²⁴

Mission-oriented innovation addressing SDG challenges may also call for unconventional policy approaches, including the hybridization of innovation types and the policy approaches that support them. Thus initiatives created at the grass-roots level may subsequently receive public financial support for their market uptake or they may partner with innovation support institutions in order to achieve wider market outreach. In turn, financing a mission-oriented innovation project can spur a hybrid innovation process instigating partnering and collaboration among a wider circle of innovation stakeholders of different type.

It is considered that national mission-oriented innovation policies are driven and implemented by an “entrepreneurial state”, i.e. a public sector that takes on itself a number of atypical roles including the risk-taking role which is usually associated with the private entrepreneur, the role of the lead investor providing innovation finance as well as that of organizing and managing the whole innovation process.²⁵ In turn, this requires broad public

²³ See Rodrik, D., “Industrial policy for the twenty-first century,” CEPR Discussion Papers No. 4767, Centre for Economic Policy Research: London, 2004; Dobrinsky, R. op.cit.

²⁴ Edquist, C. and Zabala-Iturriagagoitia, J. M. (2012), “Public Procurement for Innovation as Mission-oriented Innovation Policy”, *Research Policy*, Vol. 41, pp. 1757– 1769.

²⁵ Mazzucato, M. (2013), *The Entrepreneurial State: Debunking the Public Vs. Private Myth in Risk and Innovation*. London: Anthem Press;

support for the implementation of such policies, including the allocation of adequate human and financial resources.

All mission-oriented policies imply some form of coordination and in some cases a degree of top-down management. Hence they require the formation of specific skills and capabilities within the public administration which will be tasked with implementation as well as putting in place matching governance mechanisms and incentive structures aligned with mission-oriented innovation. The need for steering is less pronounced in approaches predominantly relying on demand-side measures. In such cases the coordination functions can be operationalized through online platforms open to all stakeholders involved in the process.

Going beyond national borders makes things even more complicated. While there are examples of successful transnational mission-oriented innovation policies (the EU's Framework Programmes and the Innovation Union initiative are examples of this), their implementation as a rule would require the institution of supranational bodies endowed with the necessary resources and decision making powers (such as the European Commission).

But if the above conditions for the implementation of mission-oriented innovation policies are met (at the national and/or international level), the policy agenda focus can in these cases switch from market fixing to market-creating and market shaping. Such policies can serve as vehicles aimed at actively creating and shaping new markets, which is consistent with the underlying paradigm of some of the SDGs.

A recent publication of UNCTAD contains a compendium of national good practices in implementing mission-oriented innovation projects that address effectively some SDGs as well as examples of successful innovative sustainable development undertakings implemented in different parts of the world.²⁶

* * *

The possible ways of employing the conceptual considerations discussed in section 3 in the policy agenda of the SPECA countries are discussed in the next sections.

4. Some guiding principles for an innovation-based policy agenda in the pursuit of the SDGs in the SPECA countries

The considerations presented in the previous sections lead to the conclusion that for countries with similar development levels as the SPECA countries, innovations ensure some of the most efficient ways and means for both achieving development objectives and for the pursuit of the SDGs. Thus an overarching principle for policy makers in pursuing and advancing SDGs should be the mainstreaming of innovation and innovative development in all related forward-looking programmes, strategies and policy documents.

Similar views and conclusions are contained in a number of analytical and policy-related documents prepared by different international organisations.²⁷ Based on this understanding, it

²⁶ UNCTAD, *op.cit.*

²⁷ See, among others, European Commission, *The Role of Science, Technology and Innovation Policies to Foster the Implementation of the Sustainable Development Goals*, Report of the Expert Group "Follow-up to Rio+20, notably the SDGs", 2015; *Entrepreneurship for Development*. Report of the Secretary-General. UN doc A/71/210, 26 July 2016; UN System Task Team on the Post-2015 UN Development Agenda, *Science, Technology and Innovation for Sustainable Development in the Global Partnership for Development Beyond 2015*; "Multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals: summary by the Co-Chairs", High-level political forum on sustainable development convened under the auspices of the Economic and Social Council 11-20 July 2016, UN document E/HLPF/2016/6. The guiding principles for an innovation-

is possible to formulate some general principles for developing an innovation-based policy agenda in the pursuit of SDGs in the SPECA countries as follows:

1. Widening and deepening the role of innovation for sustainable development policies in the national policy agenda and establishing supportive framework conditions

(Contributes to all SDGs)

Mainstreaming innovation and innovative development in the context of SPECA countries implies integrating broadly defined innovation policies into public policy goals aligned with sustainable development. By doing so, policy makers would ensure that a sustained increase in public spending in science, technology and innovation is essential for both accelerating the development process and advancing towards the sustainable development goals and social progress.

In addition, as noted above, mainstreaming may also require a redesign of the innovation policy mix in the SPECA countries so that to prioritize and stimulate innovative sustainable development undertakings, both in terms of R&D and the transformation of R&D results into marketable products and services. The operationalization of such a re-orientation may be further strengthened through concrete strategic R&D and innovation programmes and action plans for the accomplishment of innovative sustainable development undertakings identified as high national priority.

The implementation of such policy changes also requires a supporting and enabling environment and framework conditions conducive to business entrepreneurs in the SPECA countries venturing in innovative sustainable development undertakings. This might entail the need for changes in respective legislation and regulations as well as improvements in the quality of enforcement, reduction of the bureaucratic burden and simplification of the administrative procedures. Increasing policy transparency and predictability in implementation are other prerequisites of a conducive business environment. Additional policy efforts may also be needed in identifying and correcting for sustainability failures and the elimination of some specific hurdles for the successful implementation of innovative sustainable development undertakings.

Innovation systems in the SPECA countries are still underdeveloped and suffer from weak connectivity and poor linkages among innovation stakeholders. Connectivity and linkages in the innovation eco-system are essential for the efficient and smooth functioning of the innovation process. This precondition is even more important for novel ventures such as innovative sustainable development undertakings. Policy makers in the SPECA countries thus need to design and implement measures specifically targeting the strengthening of connectivity and linkages in national innovation systems, with a special emphasis on those that would facilitate efforts and projects in areas supporting sustainable development.

A general strengthening of industry-science linkages as well as partnerships between academic and R&D institutions and industry will also foster the effectiveness and efficiency of the overall innovation ecosystem and will facilitate all types of innovation, including those targeting sustainable development.

2. Innovation for sustainable development policies should be inclusive and participatory

(Contributes to SDG1, SDG3, SDG5, SDG6, SDG8, SDG16)

based policy agenda in the SPECA countries as presented in this section partly draw on some conclusions and recommendation contained in these documents.

The pursuit of SDGs is a global objective that should unite people both across and within countries. Therefore policies aimed at advancing the SDGs must be inclusive and should not in any way create new divides both across and within national borders. Moreover, the pursuit of SDGs will be more efficient and effective if people readily contribute to policy implementation; in other words, if the innovation for sustainable development policies are participatory.

These principles need to be incorporated already in the design phase of innovation for sustainable development policies in the SPECA countries in order to make such policies more participatory and inclusive and therefore mobilize greater public engagement in implementation across the whole spectrum of social actors. Innovation for sustainable development should be both inclusive and environmentally friendly and should promote pro-poor economic growth which brings benefits to all layers of society. Inclusiveness of policies also implies targeting socially inclusive development, gender equality, and elimination or reduction of poverty and income inequality. The efforts towards building greener, more inclusive societies and addressing various aspects of existing divides will in fact directly contribute to the Agenda for Sustainable Development 2030.

It is important to point out that efficient markets based on profit maximization alone may not necessarily ensure inclusiveness of economic development. This is a typical case of a market failure and corrections may only happen after adequate policy interventions. Therefore, policies need not only seek effective functioning and economic sustainability of innovation ecosystems but should also drive them to provide shared value. Hence the innovation for sustainable development policy agenda in the SPECA countries needs to be proactive towards reducing and eliminating existing inequalities of all type (income, gender, age-related, etc.). Ultimately, the implementation of this policy agenda should ensure the widest possible outreach of the benefits of innovation and innovative development, making sure that the rewards of development efforts are readily available to those who need them the most.

One specific type of policy interventions that serve these purposes are the policy measures that aim to ensure better access to finance by entrepreneurs from underprivileged societal groups such as women and young people which tend to be discriminated by financial institutions on purely market criteria. Such policies may include both a broad set of non-financial measures (such as training in financial literacy and entrepreneurship, provision of business services, technical assistance, coaching, etc.) and also a financing component in the form of credit guarantees that eliminate the elevated credit risk for such borrowers as perceived by financial institutions.

The more democratic the process of designing the innovation for development policy agenda, the greater the chances for its implementation success. Participatory policies are policy innovations that bring large constituencies and people in general directly into the policy-making and policy implementation process. They are often associated with social and grassroots innovation and may also contribute to mainstreaming of some public initiatives. The successful design and implementation of innovation for sustainable development policies in the SPECA countries would greatly benefit from such a democratization of the policy making process.

The transition towards inclusive and participatory policies will probably be a process which requires changes in traditional mentality and thinking. Schools and other learning institutions in the SPECA countries have an important role to play in this process.

3. Fostering technology catch-up as an engine of growth and a push towards achieving the SDGs

(Contributes to SDG2, SDG7 SDG8 SDG9, SDG11, SDG13)

Adopting and adapting to the local markets of existing technologies and products that enhance local productivity in developing and emerging economies such as the SPECA countries

is an important driver of innovative development. In fact, technology adoption and adaptation is one of the most efficient ways to promote technological and developmental catch-up in such economies. However, technology transfer requires specific capabilities by local innovation stakeholders, in particular, their ability to absorb and apply the new knowledge and know-how necessary to produce and deliver to the market technologically new products and services. In turn, building such capabilities implies a lasting effort of investing in local human capital intended towards raising its absorptive capacity and the ability to adapt and apply existing technologies.

Thus the overall innovation policy mix in the SPECA countries needs to be partly directed towards the transfer of modern technologies from the international market and their adaptation in the local market.²⁸ In turn, there is a need for specific types of policy instruments that facilitate this process. This will support both directly and indirectly innovative sustainable development undertakings in the SPECA countries and the achievement of the SDGs.

Most SPECA countries are also poorly connected to global value chains and international production networks. Global trade nowadays is dominated by large international conglomerates whose production process is grounded on a division of labour that generates economies of scale and economies of scope, which is also the basis of their international competitiveness. Being part of global value chains can greatly facilitate international technology transfer and can give a strong boost to catch-up growth; it can serve as an engine of implementing innovative sustainable development undertakings. The pursuit of some SDGs will only be viable through the channels of global value chains and international production networks. This also calls for targeted policy efforts in this direction, including through measures to attract foreign direct investment towards the desired sectors of the economy and the establishing of local forward and backward linkages to FDI firms.

4. Strengthening the national capacity for innovation and innovative development through education, vocational training, capacity building

(Contributes to SDG3, SDG4, SDG5, SDG8, SDG9, SDG16)

The national capacity for innovation and innovative development depends in the first place on the level and quality of the national human capital. The desired reorientation of innovation system towards sustainable development in the SPECA countries as outlined in Principle 1 would not be possible if it is not supported by matching changes in the education systems. Human capital development and the formation of innovative societies able and willing to pursue long-term objectives such as the SDGs implies sustained, lasting efforts and investment in the strengthening and modernisation of the national education systems.

Strengthening the national capacity of the SPECA countries to generate new knowledge and/or utilize creatively knowledge generated elsewhere in the local context requires to bolster all grades of education (primary, secondary and tertiary) and broaden lifelong learning, including, on-the-job professional learning, vocational training and different forms of capacity building.

Furthermore, science education needs to be integrated in the curricula from primary and high school levels to motivate young people to pursue scientific careers. Young innovators, especially in the fields of green economy and social entrepreneurship, should be supported and encouraged to develop their skills in order to be able to realize their innovative visions and business ideas. They need to be provided with opportunities for entrepreneurship training, business advice and coaching.

²⁸ In fact this is already happening in some SPECA countries. Thus technology transfer and adaptation is spelled out as one of the main objectives of the national innovation system of Kyrgyzstan.

Science and technology should be both attractive and accessible to all levels and forms of education and learning to help individuals with innovative ideas to develop them further or to adapt innovations to the local market. In this regard, policies need to establish a conducive environment for the diffusion of knowledge both locally but also across borders.

Stepping up the pace towards the SDGs by SPECA countries would necessitate a certain refashioning of education and training for innovation and entrepreneurship at all levels including the provision of new opportunities for acquiring specific vocational skills that would be needed for the successful accomplishment of innovative sustainable development undertakings. The successful adjustment of education and vocational training system in the SPECA countries requires the establishment of environments conducive to active learning by students and trainees which should also motivate and encourage self-development efforts by all individuals.

5. Support to entrepreneurship in innovative sustainable development undertakings

(Contributes to SDG1, SDG4, SDG5, SDG8, SDG10, SDG11)

Innovative entrepreneurs seeking to bring their ideas to the market are the key engines of any innovative product or service. Innovative sustainable development undertakings will not materialize if not driven by such entrepreneurs. Therefore the policy agenda pursuing the SDGs also needs to assign a central role to entrepreneurs. As a general principle, policy makers in the SPECA countries should establish an enabling environment and proper incentives to local entrepreneurs in innovative sustainable development undertakings.

Support to innovative entrepreneurs can take different forms but for ensuring policy coherence it is advisable to embed them in comprehensive public programmes linking them to other social and economic development objectives. Entrepreneurship support schemes could serve as catalysts for the emergence of new engines of economic growth, job creation, modernisation and restructuring of the economy. This could also propel an autonomous deepening of the local market even in the absence of strong linkages to the international market.

The most important and difficult part in the innovation process is the transformation of the innovative idea into a marketable product or service. The reality in all countries in the world is that most of the ideas do not manage to make this difficult road due to numerous hurdles and obstacles. The statistics is even more disappointing in emerging and developing economies like the SPECA countries. Therefore, a key element of the innovative sustainable development policy agenda should be the development and upgrading of the infrastructure of support institutions and intermediaries that could facilitate the market uptake of innovative ideas and entrepreneurial projects in general.

Entrepreneurship support can be enhanced through the new opportunities offered by the rapid changes in technology and Internet services. National policies and strategies in support to entrepreneurs in innovative sustainable development undertakings can benefit from the opportunities of e-commerce and the reliance on e-mentoring platforms.

Public policies in the SPECA countries also need to prioritize the upgrading of entrepreneurship education as well as embedding entrepreneurship into the formal education process at all levels, starting from primary and secondary schools. Entrepreneurship courses in SDG-relevant areas and classes can take different forms and can be offered either by the institution or by external providers. Entrepreneurship education curricula need to ensure skills are developed in line with the demands of competitive markets, by adapting new teaching methods and engaging with the private sector.

Social entrepreneurship should also receive due attention by SPECA policy makers because of its potential to address sustainable development challenges by reducing inequalities

and enhancing social cohesion. Support to social entrepreneurial initiatives can contribute to the development of an inclusive solidarity economy, which caters to the needs of cooperatives and social enterprises and recognizes the role of collective action and active citizenship in integrated economic, social and political empowerment of disadvantaged or fragile groups.

6. Facilitating access to finance for innovative sustainable development undertakings

(Contributes to SDG2, SDG5, SDG8, SDG9, SDG11)

Improving access to finance for innovative new companies as well as for SMEs in general is a key challenge and policy objective in most emerging and developing countries. It is well known that financing innovative entrepreneurial ventures is much riskier than financing established businesses and for this reason commercial banks are reluctant to engage in such business practices. This is another typical case of a market failure which needs to be addressed by public policy. Policy interventions take different forms, from the establishment of public funds tasked with early stage financing of innovative firms to various guarantee schemes in which governments engage in underwriting credit extended by commercial banks to SMEs thereby substituting for missing collateral and/or covering parts of the perceived high credit risk.

Such traditional approaches of public intervention need to be further developed and strengthened in the SPECA countries, with an extra focus of facilitating the access to finance for innovative sustainable development undertakings in these countries. Policy makers in these countries may consider supplementary instruments such as targeted credit lines, direct lending schemes and equity guarantees aimed to ease the access to finance by entrepreneurs and companies engaged in such ventures.

Moreover, governments of SPECA countries may consider additional measures catering to the needs of some target groups such as women entrepreneurs and young entrepreneurs and further facilitating their access to finance, providing in addition training in financial literacy. The latter can be supported by producing and disseminating relevant training materials for use by entrepreneurs.

National and international development banks are among the most promising sources of funding of innovation for sustainable development. Unlike private commercial banks, development banks can be entitled already through their articles of incorporation to take more risk associated with projects contributing to their specific development mission and objectives. Hence they can fund projects at interest below the commercial market rates and can engage in long-term projects. However, for national and international development banks to become effective sources of funding of innovative sustainable development undertakings, this orientation might need to be specifically introduced in their mission and articles of incorporation.

There are a number of new developments in the financial sphere that also open new avenues in the funding of business ventures that were outside the scope of structured funding. Blended finance employs the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets. It offers the opportunity to scale up commercial financing for developing countries and to channel finance towards investments with development impact. Significant growth has occurred in the use of private funds for impact investing, which is defined by the Global Impact Investing Network as investments made into companies, organizations and funds with the intention to generate social and environmental impact alongside a financial return. Such new developments in the financial sphere merit the attention of policy makers in SPECA countries as they offer new opportunities for financing innovative sustainable development undertakings.

Early stage financing is in itself a business area which develops rapidly with the advance of modern technology offering a number of innovative online financing mechanisms such as crowdfunding, marketplace and peer-to-peer lending and other alternative finance platforms. These new mechanisms use technological innovations to change the way people, businesses and institutions access and invest money and can serve as indispensable complements to the existing more traditional methods of financing innovative sustainable development undertakings.

Public policy often lags behind such new initiatives so policy makers in SPECA countries need to follow closely such developments and provide policy support, wherever relevant and necessary for the engagement of new online financing mechanisms in the funding of innovative sustainable development undertakings. Moreover, these innovative online financing mechanisms widen the range of financial services accessible to excluded and underserved market segments including women entrepreneurs and young entrepreneurs.

7. Innovation in agriculture will strongly support the efforts by the SPECA countries to achieve the SDGs

(Contributes to SDG1, SDG2, SDG5, SDG8, SDG10, SDG12)

Innovation in agriculture caters to both social and environmental concerns, embodying the link between food security and climate change. Mitigating climate change, the development of resilient but sustainable and intensive agriculture as well as the provision of extension services to upgrade farming productivity, all require innovation in the agri-business. Moreover, all these aspects and factors are not only present but are well articulated in the SPECA countries: on the one hand, traditionally, all of them are heavily dependent on the agricultural sector; on the other hand, these economies face a range of common- cross-border environmental concerns with strong impact on agriculture (such as water management and irrigation) that can only be dealt with through common efforts and international cooperation.

Therefore support to innovation in agriculture needs to be a strategic policy priority in the policy agenda in the SPECA countries; this is also an area where pro-active policy measure could bring the most significant and immediate positive effects. In particular, governments could support the acceleration of technology transfer in agriculture through the import of modern agri technologies and the introduction of advanced methods and models for managing agri-businesses.

One specific policy objective for the SPECA countries in this area could be the support to microfinance at preferential terms to entrepreneurs in agriculture and food processing. Women and young people could be specific targets of such microfinance-based entrepreneurship support schemes as one of the instruments to enhance their entrepreneurial spirit. Furthermore, such schemes could also be extended to support University start-ups and/or spin-offs in the agri sectors. Related to that, more attention needs to be allocated to entrepreneurship support in higher education institutions by developing new technology transfer offices and broadening the scope of their activity. One of the key functions of such offices should be the support to in-house-bred entrepreneurship and its first steps in the form of university start-ups and spin-offs.

8. The innovation-based policy agenda in the pursuit of SDGs will only be efficient if it is backed by targeted demand-side policy measures

(Contributes to SDG3, SDG6, SDG7, SDG8, SDG9, SDG11, SDG12, SDG13)

The nature of the SDGs implies the use of systemic policy approaches which integrate supply- and demand-side logic and measures. The rationale for demand side policies is to raise the attraction to customers of (and hence stimulate the demand for) the targeted technologies, products and services which are considered to contribute to specific social challenges or other societal objectives. This is done through demand side instruments, such as measures to stimulate the private demand for innovation; public procurement; pre-commercial procurement; innovation inducement prizes; standardisation and regulation, to name some of them.²⁹

Public procurement is one of the most effective and efficient demand-side innovation policy approach, especially if it is embedded into a broader context of policy instruments stimulating innovation in enterprises such as public co-funding of private innovation projects as well as intervention through regulation.³⁰ Public procurement of innovation occurs when public authorities act as an “early user” customer for specific innovative goods or services, therefore leading by example other economic agents to follow.

Some demand side innovation policy instruments deliver market signals to business agents that are aimed to change their behaviour in a specific way, in this case, by stimulating their demand for targeted innovations. These can include, on the one hand, supplementary taxes that curb demand considered undesired by the policy (such as energy taxes related to the level of carbon emissions) and, on the other hand, tax rebates that seek to boost the desired type of demand (e.g. for green technologies boost or for R&D in specific areas).

Regulation as well as technical standards are rules set by public policy which also aim to influence the behaviour of private actors towards desired directions. If properly designed such instruments can also shift the direction of innovation towards the SDGs as well as activities that are inconsistent with them. Such policies (such as specific technical requirements as well as standards on polluting industries) have long been used to induce eco-innovation and improved environmental performance.

Changes in relative prices can also raise the demand by the private sector of specific technologies such as clean technologies and areas critical for sustainable development. The respective changes in the behaviour and performance of private sector actors as influenced by policy and regulatory processes can provide a critical input for innovative activities towards the desired results of this process. The articulation of such demand for innovation through the regulatory process can play an important role in promoting innovative sustainable development undertakings.

9. On the road to achieving the SDGs, SPECA countries need to address common, cross-border concerns through joint coordinated efforts and cooperation

(Contributes to SDG2, SDG6, SDG7, SDG13, SDG15, SDG16, SDG17)

In pursuing the SDGs, policy makers in every SPECA country are facing some challenges that are of cross-border nature and are also common or similar to the challenges that policy makers in other SPECA countries are facing. Examples include but are not limited to environmental concerns, water management, transportation issues and problems. No country taken alone and in isolation from the rest of the world is not in a position to implement globally efficient and effective solutions to such concerns. Local national innovation in this case is not a panacea. Reaching and implementing equitable and mutually beneficial solutions that address such challenges does require innovation but also cooperation and agreement by all countries

²⁹ European Commission (2015), *Supply and Demand Side Innovation Policies*. Final Report, 20 February 2015.

³⁰ Aschhoff, B., and Sofka, W. (2008), “Innovation on Demand: Can Public Procurement Drive Market Success of Innovations”, ZEW Discussion Papers, No. 08-052

concerned and joint cross-border efforts and coordination of the process of their implementation.

Importantly, cooperation by SPECA countries in this case is needed already at the design phase of any effort targeting such challenges. Countries and policy makers in SPECA countries need to agree on the approaches (and the joint innovative sustainable development undertakings) to address the cross-border or common issue before any implementation starts by any country. This requires a comprehensive joint policy dialogue on these issues involving all countries in the subregion, and this dialogue needs to start as soon as possible as the design and implementation of such undertakings will inevitably take longer time than that of undertakings limited within national borders.

10. Seek to engage key stakeholders of joint innovative sustainable development undertakings in SPECA countries through partnerships

(Contributes to SDG5, SDG6, SDG9, SDG12, SDG13, SDG15, SDG17)

As noted above, modern innovation involves many stakeholders and requires interaction and cooperation among them. Best practices show that an active role for all stakeholders, both from the public and the private sector, is needed to achieve the common goals. However, innovation stakeholders may have different or conflicting interests which prevent or obstruct collaboration among them. These problems are aggravated by the existence of sustainability failures which may impede the implementation of some innovative sustainable development undertakings. In this case, a specific policy intervention may help align the interests of different innovation stakeholders and stimulate their collaboration, eventually, through the establishment of partnerships among them.

Therefore policymakers in the SPECA countries need to design and implement coherent policies and coordinated approaches to enhance partnerships among the stakeholders in innovative sustainable development undertakings thereby proactively involving the private sector towards achieving the SDGs. Such policies could also encourage grass-roots solutions connecting innovative people with technologies and finance.

Flexible science, technology and innovation action plans and technology road maps aimed at pursuing the SDGs should assign a special focus to the mobilisation of stakeholder partnerships in innovative sustainable development undertakings. Such partnerships could be a means of uniting all interested stakeholders, including financiers, to work towards common goals such as the SDGs and to benefit from periodic monitoring and scientific analysis.

Partnerships require leadership and need to be adequately resourced. International good practices suggest that governments and other public bodies are better suited for the leadership role of such partnerships thanks to their greater convening power. The combination of engaged innovation stakeholders steered by the public sector can ensure that the innovation ecosystem will function effectively, be economically sustainable and provide shared value in the pursuit of the SDGs. Such stakeholder partnerships will also ensure that entrepreneur networks will be consolidated and will establish better links between entrepreneurship and innovation.

The European Union countries have examples of good practice in this area through the so called European Innovation Partnerships (EIPs). EIPs are part of the EU's Innovation Union initiative and are envisaged as a framework for bringing together all relevant stakeholders across policies, sectors and borders to speed up innovations that address major societal challenges, and contribute to gaining competitive advantages for growth and job creation in Europe.³¹ So far the EU has launched five EIPs to address the following key social challenges:

³¹ The EC defines EIPs as a new, challenge-driven approach to EU research and innovation, focusing on societal benefits and a rapid modernisation of the associated sectors and markets. According to their declared objectives,

EIP on Active and Healthy Ageing; EIP Water; Agricultural Productivity and Sustainability EIP; EIP on Raw Materials and EIP on Smart Cities and Communities. The focus of most of these EIPs is also aligned towards the SDGs so these partnerships will also support EU countries in their efforts towards achieving the SDGs.

The EIPs are thus an excellent example of a good practice in the area of partnerships that merits being studied carefully by the SPECA countries with a view to designing and launching similar partnership initiatives in the subregion.

11. Awareness raising on the role of innovation in the efforts of the SPECA countries to achieve the SDGs

(Contributes to all SDGs)

The successful implementation of such a complex policy agenda as that related to the pursuit of the SDGs by the SPECA countries and the promotion of innovation as a key driver of this agenda require broad public support. Public support is also essential for applying all the above guiding principles for an innovation-based policy agenda. Mobilizing such support in the SPECA countries would only be possible if the public at large is well informed about the objectives, rationale and expected outcomes of such a policy agenda.

Therefore, targeted policy efforts are needed by all SPECA countries to enhance the awareness on technology and innovation in society and the creation of a culture of innovation. These efforts could include both publicity campaigns directed to the broad public and focused awareness raising efforts on selected specific topics, in particular, those related to the SDGs. Among others, awareness implies instigating respect among the public for professions (such as innovators and innovative entrepreneurs) contributing to sustainable development.

Table 7 illustrates how the principles for an innovation-based policy agenda in the SPECA countries outlined above would support the efforts of policy-makers and societies in the pursuit of the different SDGs. As can be seen in this table, these principles will also prioritize the pursuit of SDGs identified as high priority by the SPECA countries and those with largest achievement gaps as discussed in section 2 of the paper.

* * *

“EIPs should act across the whole research and innovation chain, bringing together all relevant actors at EU, national and regional levels in order to: (i) step up research and development efforts; (ii) coordinate investments in demonstration and pilots; (iii) anticipate and fast-track any necessary regulation and standards; and (iv) mobilise ‘demand’ in particular through better coordinated public procurement to ensure that any breakthroughs are quickly brought to market.” (http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=eip)

Table 7. Principles for an innovation-based policy agenda pursuing the SDGs in the SPECA countries

	Guiding principles	Supports the following Sustainable Development Goals:																
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
1	Widening and deepening the role of innovation for sustainable development policies	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	Innovation for sustainable development policies should be inclusive and participatory	X		X		X	X		X								X	
3	Fostering technology catch-up as an engine of growth and a push towards the SDGs		X					X	X	X		X		X				
4	Strengthening the national capacity for innovation and innovative development			X	X	X			X	X							X	
5	Support to entrepreneurship in innovative sustainable development undertakings	X			X	X			X		X	X						
6	Facilitating access to finance for innovative sustainable development undertakings		X			X			X	X		X						
7	Innovation in agriculture to achieve the SDGs	X	X			X			X		X		X					
8	The innovation-based policy agenda is backed by demand-side policy measures			X			X	X	X	X		X	X	X				
9	Addressing common, cross-border concerns through joint coordinated efforts and cooperation		X				X	X						X		X	X	X
10	Engage key stakeholders of joint innovative sustainable development undertakings through partnerships					X	X			X			X	X		X		X
11	Awareness raising on the role of innovation in the efforts to achieve the SDGs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Source: Author's compilation

The policy principles for an innovation-based policy as described above are already present, albeit to a different degree, in the policy agenda of SPECA countries and there are a number of practical examples when they already contribute to the implementation of innovative sustainable development undertakings. The Annex presents some selected examples of such good practices, based on a series of innovation policy reviews undertaken by the UNECE in some SPECA countries.

5. Recommendations and policy options for Governments of SPECA countries

The considerations and conclusions presented in the previous sections provide the basis for suggesting some concrete recommendations and policy options that governments in SPECA countries may wish to take into consideration in planning their efforts towards achieving the SDGs.

The recommendations formulated below should not be regarded as an all-inclusive set of the policy options; such a comprehensive policy programme agenda is reflected in the guiding principles for an innovation-based policy agenda as presented in the previous section. The recommendations proposed in this section rather offer some practical guidance and suggest some concrete policy actions and steps that policy makers in SPECA countries could take in selected key policy areas in order to facilitate and accelerate innovation for sustainable development in their countries and which could give a push towards achieving the SDGs.

5.1 Recommendations and policy options for national governments

1. Adopt National Strategic Sustainable Development Programmes (in cases when this has not been done yet)

- The National Strategic Sustainable Development Programmes would have two main purposes: 1) to define the national priorities within Agenda 2030; 2) to embed the SDGs into the national context, policy priorities, objectives and targets;
- These programmes should be based on an in-depth analysis of the current situation with the implementation of the SDGs and the politico-organizational background for introducing innovations in each country, as well as a definition of the desired outcomes;
- The programmes would also set the envisaged timeline in achieving the SDGs, the resources that would be allocated and/or mobilised for this purpose as well as key policy instruments that will be applied;
- Innovation should take a central role in the programmes which would also define key national R&D and innovation objectives as well as the mechanisms and instruments to support innovative sustainable development undertakings;
- The programmes would also support the mainstreaming of innovative sustainable development policies and undertakings thus facilitating their development and implementation in national development plans and strategies;
- Undertake an awareness-raising campaign targeted towards the wide public to help people get better understanding of SDGs and the role of innovation for their achievement.

2. Develop and upgrade the national institutional capacity and capability to pursue the SDGs

- Identify a lead agency to guide national innovative sustainable development undertakings;

- Set up national science-to-policy task forces for each SDG in order to identify bottlenecks and needs along relevant innovation chains, and propose policy measures to address existing bottlenecks;
- Define context-driven incentives to motivate the engagement of stakeholders in the process; promote a participatory approach in the formulation and implementation of innovative sustainable development undertakings;
- Adopt plans for capacity development of key stakeholders including innovation policy learning and the attainment of implementation skills;
- Support the development of inclusive and participatory local innovation systems, which bring together local stakeholders in identifying and implementing innovative sustainable development undertakings to key local problems including sustainable urban development and energy consumption, green housing, environmentally sound infrastructure, etc.

3. Adopt national action plans to strengthen the innovation infrastructure and innovation support institutions and measures to improve connectivity and linkages in the national innovation system

- Based on a needs assessment (including analysis of the existing situation and the desired outcomes), consider establishing complementary innovation support institutions, such as business incubators, science and technology parks, technology transfer centres, etc. especially focused on the support of innovative sustainable development undertakings;
- Consider establishing some of these new institutions as public-private partnerships with the participation of the industry with the objective to facilitate the implementation of industrial projects of technological upgrading;
- Design programmes of technical assistance (including the facilitation of the access to finance) to innovative entrepreneurs, SMEs and grassroots innovative initiatives to be carried out with the assistance from innovation intermediaries and support institutions;
- To improve connectivity and linkages in the innovation ecosystem, funding of innovative sustainable development undertakings could be made conditional on the establishment of collaborative linkages among innovation stakeholders.

4. Develop and introduce policies and instruments aimed to facilitate the transfer of technology critical for sustainable development

- Develop internationalization strategies targeting innovation for sustainable development, aligned with the National Strategic Sustainable Development Programmes;
- Introduce incentives for the business sector (including demand side measures such as tax and tariff relief, access to subsidized credit, government guarantees, etc.) specifically targeting the technological upgrade of production facilities and the acquisition of technological equipment in areas critical for sustainable development;
- Introduce policy instruments supporting international linkages with global technological value chains; the strengthening of international linkages leading to global technological value chains should be one of the key strategic objectives of innovation for sustainable development policies;
- Develop strategic approach to FDI by simplifying administrative procedures and offering additional incentives in cases FDI contributes to linkages to global technological value chains; provide organizational and political support for the sustainability of investments that support innovation and sustainable development.

5. Enhance the system of financing of innovative undertakings, especially in areas critical for sustainable development

- Introduce measures for strengthening early stage financing of innovative entrepreneurs and SMEs (including support to university start-ups and/or spin-offs) putting special emphasis on non-debt financing; consider establishing publicly supported funds that emulate the operations of private early stage financing institutions;
- Introduce special incentives for the operations of business angels and/or venture capital firms;
- Consider establishing economy-wide microfinance-based entrepreneurship support scheme; envisage options for support to underserved groups such as women and young entrepreneurs;
- Establish, in cooperation with international donors, financing institutions tasked with support to innovative sustainable development undertakings in their post-seed phase and employing instruments such as credit and equity guarantees, targeted credit lines, direct lending schemes and others;
- Consider policy measures facilitating the operations of online financing mechanisms for the funding of innovative sustainable development undertakings.

6. Stimulate the formation of innovation for sustainable development partnerships

- Define socially important areas facing important sustainable development challenges where multiple stakeholder participation can deliver innovative solutions for achieving the SDGs (drawing on the EU experience with European Innovation Partnerships);
- Seek to mobilize motivated innovation stakeholder communities (including public sector, academia and businesses) in these areas with a view to generating bottom-up innovative initiatives in these areas;
- Engage, through public initiatives, stakeholder communities in knowledge and information sharing with a view to identifying possible solutions for project risk sharing; this is a precondition for engineering new innovation for sustainable development projects that would not have been in place in the absence of this intervention;
- Provide additional incentives to stakeholders in innovation for sustainable development partnerships motivating them to undertake innovative sustainable development projects and carry out these projects till successful end.

5.2 Recommendations and policy options that could be implemented through international cooperation

7. Establish a SPECA Network for Innovative Sustainable Development Undertakings

- This will be a multi-stakeholder regional network of key stakeholders (including public bodies, businesses, academic and R&D institutions, NGOs and individuals-public figures) engaged in the promotion of innovative undertakings targeting the SDGs;
- Its mission could be formulated as follows: to support the process of identifying and implementing transformative innovative sustainable development undertakings to key common issues in the SPECA countries by also fostering cross-border coordination and multi-stakeholder collaboration;
- The main tasks of the network could include the following:

- Contribute to awareness raising on innovative sustainable development undertakings among SPECA policymakers and the public at large;
- Share and exchange good practices and policies in pursuing SDGs and SD targets, in particular, through innovative undertakings and cooperative cross-border efforts; showcase specific undertakings and achievements in this area;
- Contribute to the design of practical innovative sustainable development undertakings at the national and regional level and their implementation;
- Liaise with similar international bodies and structures for an expert dialogue and mobilising additional expertise and resources including such facilitating technology transfer for innovative sustainable development undertakings;
- Coordinate and help align SPECA countries efforts in this area with the UN Forum on Science, Technology and Innovation for the Sustainable Development Goals;
- Discuss options for establishing a SPECA Sustainable Development Innovation Fund for early stage support to innovators in sustainable development undertakings in SPECA countries to be presented to the governments of SPECA countries and the international donor community.

8. The efforts by Governments in the SPECA countries can be facilitated by an intergovernmental body tasked with trans-border coordination.

- This can take the form of a SPECA Working Group or an Intergovernmental Forum on Sustainable Development jointly supported by UNECE and ESCAP;
- The new SPECA intergovernmental body will perform, among others, the following main tasks:
 - Assist in drawing a list of SDGs and SD targets that are identified as high priority in the national SD strategy documents of the SPECA countries;
 - Assist in identifying within this list a subset of SD targets that call for trans-border/regional cooperation and approach;
 - Facilitate the SPECA regional policy dialogue on cooperative innovative undertakings for sustainable development and the liaison with the international donor community;
 - Assist in mobilising donor support for technical assistance/policy advice and project design and implementation with respect to innovative sustainable development undertakings of trans-border nature.

A N N E X

Examples of Good Practices and Initiatives Supporting Innovation for Sustainable Development in SPECA Countries³²

The Russian-Kyrgyz Development Fund (Kyrgyzstan)

The Russian-Kyrgyz Development Fund (RKDF - <http://www.rkdf.org/>) was established in accordance with an intergovernmental agreement between the Russian Federation and Kyrgyzstan of 2014. As per this agreement, the RKDF's mission is to contribute to the economic cooperation between the two countries, the modernisation and development of the Kyrgyz economy and the Eurasian economic integration. In accomplishing this mission, RKDF has defined for itself the following main areas of activity:

- Debt financing of bankable projects in priority areas of the Kyrgyz economy, including such with Russian participation;
- Equity financing in business entities operating in Kyrgyzstan;
- Facilitating privileged access of Kyrgyz business entities to medium- and long-term finance;
- Support to the development of the Kyrgyz financial sector including the introduction of new financial services;
- Support to its clients in the introduction of modern corporate management.

As of August 2017, RKDF had approved (directly or through its partner banks) funding to 761 projects in Kyrgyzstan for a total amount of USD 246 mn.

RKDF's mission and activities to a large extent match the Kyrgyz government policy goals for innovative development through modernisation of the Kyrgyz industry and business. From this point of view the Fund can be regarded as a key innovation support financial institution whose activity is aligned with the national innovation and modernisation policy. Most of the projects funded by RKD perform activities and functions which are consistent with the SDGs. RKDF provides credit to its borrowers at rates that are considerably better than the prevailing market rates in Kyrgyzstan. Thereby RKDF not only acts as a genuine development financial institution but also contributes to Kyrgyzstan's efforts towards the SDGs. This is an example of a good practice in engaging a development fund in financing innovative undertakings and activities directly contributing to the SDGs.

Project “Sustainable Energy – Integrated Rural Development” (Tajikistan)

The project was initiated and led by the UNDP office in Tajikistan and was partly supported by the Global Environment Facility (GEF). The project is part of the UNDP country strategy in Tajikistan and focuses on the scaling up of pilot activities for the acceleration of progress towards the achievement of the MDGs (subsequently, the SDGs) with a particular focus on improving access to renewable energy in rural regions for the purpose of poverty reduction and triggering economic development.

³² The cases presented in the Annex draw from a series of policy reviews undertaken by the UNECE in some SPECA countries: *Innovation Performance Review of Kazakhstan* (United Nations, New York and Geneva, 2012); *Innovation Performance Review of Tajikistan* (United Nations, New York and Geneva, 2015); *Innovation for Sustainable Review of Kyrgyzstan* (United Nations, New York and Geneva, forthcoming).

The Project specific objective is to accelerate the development of small-scale hydropower (SHP) through:

- Removing barriers towards an enabling legal and regulatory framework including the adaptation of an enhanced legislative and regulatory framework for SHP development;
- Capacity building of local professionals on the operation and maintenance of SHP facilities to facilitate the emergence of an SHP market supply and support chain;
- Developing sustainable delivery models for scaling up the development of renewable energy in Tajikistan and integrating them into SHP-based rural development models;
- Development of a National Scaling-up Programme of Renewable Energy-based Integrated Rural Development.

The project combines both economic and technology development goals and supports rural development and the engagement of local stakeholders including universities. It will significantly accelerate the development of SHP generation in Tajikistan thus reducing the use of fossil fuels for power and other energy needs. At the same time, it supports rural development and wellbeing in rural communities.

The project is being successfully implemented and its success was largely due to the joint cooperative efforts and partnership of the key stakeholders involved: the Ministry of Energy and Water Resources, the Ministry of Economic Development and Trade, district and regional authorities, district electrical network enterprises, district and regional water management companies; district and regional maintenance companies, construction companies, local communities, NGOs, local training providers, etc.

Alliance of Technology Commercialization Professionals (Kazakhstan)

The Alliance of Technology Commercialization Professionals (ATCP) is an association of individuals and legal entities jointly supporting the development of a technology commercialization system in the Republic of Kazakhstan which would boost economic growth and social welfare in the country. ATCP sees the bridging of the gap between R&D and the market as its main mission and seeks to perform this by supporting the development of a technology commercialization system. Among ATCP's main tasks are the competence and capability development of innovation stakeholders as well as the upgrading of the regulatory and legal framework in the field of technology commercialization and intellectual property protection.

ATCP organizes various training seminars on the commercialization of technologies; it provides consultations on intellectual property related issues and determination of the intellectual property policy of the company; organizes exhibitions, international and national scientific conferences, symposia and conduct other events in the field of distribution of information on technology commercialization.

In particular, ACTP implemented a "Technology Commercialization" project supported by the World Bank. As part of this project ACTP conducted a grant issue program among groups of senior and junior researchers. As a result 33 technology commercialization proposals (out of 785 applications in 3 rounds of grant program) were selected for funding.

ACTP's activities support and are fully consistent with innovation for sustainable development objectives and, especially if they will be guided in a mission-led fashion, can support the policy agenda targeting the SDGs.

Increasing youth employment through the promotion of entrepreneurship (Start-Up Choihona project), Tajikistan

The Start-Up Choihona project, initiated by the United Nations Volunteers (UNV) programme (<https://www.unv.org/our-stories/>), is a joint initiative of government, development institutions and private sector partners to support innovative entrepreneurship and increase youth employment. The Start-Up Choihona project has so far organized two national entrepreneurial competitions promoting innovation and youth employment. Quarterly competitions offer an opportunity for new entrepreneurs to present their business ideas to a panel of judges. Respectively, young Tajik entrepreneurs have the chance to get feedback on whether their business ideas could work and gain access to valuable networks of potential business partners and investors. The final goal is to encourage youth to be more self-reliant and to promote the entrepreneurship mindset and attitude.

The Start-Up Choihona project succeeded in mobilizing important partners from the private sector such as Accelerate Prosperity (an initiative of the Aga Khan Development Network), which provides prizes for entrepreneurs, the School of Young Entrepreneurs and the Club of Young Entrepreneurs, which provide scholarships for entrepreneurship schooling.

Since the launch of the project in November 2016, over 100 entrepreneurs have pitched their business ideas and shared their marketing skills in competitions in the sectors of agriculture and ICT as well as in small production and services businesses. At least 300 start-ups across Tajikistan will be supported within two years through trainings on marketing, legislation, regulation and taxes, among others. The objective is that at least 200 small entrepreneurs will be self-employed at the end of the two years.

The initiative is specially designed to respond to the need of involving the young people of Tajikistan in achieving SDG 8, namely, to increase economic growth by promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

KG Labs Public Foundation, Kyrgyzstan

KG Labs Public Foundation is a joint public-private initiative to boost knowledge-intensive jobs and a start-up ecosystem in Kyrgyzstan is whose main objective is to connect the local community with a global start-up network, private equity and venture capital. It advocates the benefits of the existence of a healthy startup community by undertaking awareness raising among policy makers, taking a pro-active stance in the drafting of related legislation and regulations as well as in developing the country's strategy on the knowledge economy. It is financed from private sources and funds from international partners like UNDP and USAID. In addition, it undertakes fundraising from local communities.

The KG Labs Public Foundation organizes concrete activities to support the start-up ecosystem such as international start-up events, hackathons to increase the skills of local community members, nation-wide start-up competitions, helping higher schools and other educational organizations to develop curriculum on start-ups, creating of business angel networks, as well as skill building regarding networking and communication.

All these activities contribute to the establishing of a conducive environment for innovative entrepreneurship in Kyrgyzstan and therefore for the successful implementation of innovative sustainable development undertakings, consistent with the policy agenda in support of the SDGs.

Science and technology parks in Kazakhstan

Science and technology parks have been developed in many countries as a way of supporting the commercialization of technology, particularly, where this is derived from public sector research. The authorities of Kazakhstan recognized early on the potential of science and technology parks and engaged in the development of a network of technology parks which is perceived as an essential building block of the national innovation system. Parks are also considered as vehicles for attracting investment to hi-tech industries, stimulating technology transfer and ultimately contributing to the building of a knowledge-intensive economy.

At present some 19 science and technology parks operate in Kazakhstan (including institutions that perform similar functions), 11 of which are located in the two main cities, Astana and Almaty. The main policy objectives associated with these initiatives include:

- Strengthening collaboration among stakeholders in the innovation process;
- Support to the formation of the regional technological and industrial infrastructure and capacity needed to encourage innovation;
- Providing support to innovative entrepreneurs and conditions for the commercialization of innovative ideas and scientific research;
- Offering incubator facilities and support for innovative entrepreneurs and SMEs;
- Providing management training;
- Promotion of new technologies for industrial modernisation;
- Promoting the internationalization small high-tech firms;
- Attracting foreign direct investment.

The key difference of Kazakhstan's approach to science and technology parks from that in other neighbouring countries is its regional focus: the network of such parks basically covers the territory of the whole country. In that, it epitomizes a well-developed innovation support infrastructure that is fully aligned with the SDGs and can support a range of innovative sustainable development undertakings.