

Towards Technological Transformation of the SPECA Countries: The Innovation Imperative for Sustainable Development ^{*)}

Background paper for the

**Second Session of the SPECA Working Group on Innovation and Technology for Sustainable Development, 20-21 October 2021, Bishkek, Kyrgyzstan
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^{*)}This paper was prepared by Rumen Dobrinsky by integrating some key insights and conclusions from previous analytical reports on innovation for sustainable development in the SPECA subregion commissioned by the UNECE, namely: Slavo Radosevic (2021), “Towards Industrial Policies to Support Technology Upgrading for Sustainable Development in Central Asia (SPECA Subregion)”, March 2021; UNECE (2021), *Business Incubators for Sustainable Development in the SPECA Subregion*, 2021; Rumen Dobrinsky (2020), “Science, Technology and Innovation (STI) Gap Assessment of the SPECA Countries”, Analytical study, December 2020; Rumen Dobrinsky (2019), “How to Propel Inclusive and Sustainable Growth in the SPECA region?”, Background paper for the 2019 SPECA Economic Forum; Rumen Dobrinsky (2017), “Promoting Innovation in Central Asia – Shaping New Markets”, Background paper for the 2017 SPECA Economic Forum, December 2017 as well as a series of Innovation for Sustainable Development Reviews undertaken by the UNECE in the SPECA countries.

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1. Introduction and background

The countries participating in the United Nations Special Programme for the Economies of Central Asia (SPECA)¹ signed up to Agenda 2030 and already made important practical steps in their pursuit of the Sustainable Development Goals (SDGs). The pursuit of the SDGs calls for innovative policy approaches and wide-ranging innovation in the broad sense. In this context, the ambition for technological transformation targeting sustainable development features prominently in the medium- and long-term policy goals of the SPECA countries.

The challenge of economic and technological transformation has become even more urgent in the light of the impending energy transition and shift towards ‘green growth’, the devastating effects of Covid-19 crisis on the world economy, as well as the expected impacts of rapid global technological change on the competitive position of these economies. At the same time, industrial activities in the SPECA countries have been on a declining path in the past three decades, focussed mainly on mining and manufacturing of commoditised, undifferentiated products for the local or regional markets. Economic structure, levels of productivity and patterns of technology and industrial upgrading in these economies lag significantly behind those in high-income economies. Therefore, the need for technological transformation therefore also stems from the developmental challenges faced by these countries.

Given the transboundary nature of many regional sustainable development challenges, such as those related to water, energy, environment and transport, both national and cross-border efforts would be needed in order to be effective in the pursuit of new technological solutions to these challenges. Hence the SPECA countries would need to work together towards cooperative solutions aimed at technological transformation and sustainable development to the mutual benefit of all countries in the region.

The UNECE has a mandate to promote policies that support innovation, technological progress and sustainable development among its member States, including those in the SPECA subregion. As a result of a series of discussions, the SPECA Governing Council approved in 2019 the SPECA Innovation Strategy for Sustainable Development and encouraged the SPECA countries, donors and partner organizations to support its implementation.

¹ Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

As reflected in this strategy, the ambition of the SPECA countries is to develop and consolidate their national capacities and capabilities to design and implement innovation policies for sustainable development taking into account not only their national contexts and existing constraints but also recognizing any possible transboundary effects created. In accordance with this strategy, the SPECA countries will aim to work together to strengthen their institutional frameworks for regional cooperation regarding the implementation of innovation policies for sustainable development with possible cross-border effects to achieve beneficial regional synergies.

Furthermore, the UNECE, together with ESCAP, is conducting the UNDA project 2023N “Strengthening innovation policies for SPECA countries in support of the 2030 Agenda for Sustainable Development”. The project aims to support the seven participating SPECA countries in their efforts to spur innovation as a central driver of the increasingly urgent transition from a low productivity and resource-intensive model of economic development to knowledge-based and more sustainable economic growth, in line with the SDGs. The project’s main objective is to strengthen the institutional capacities of the SPECA countries to harness innovation as a driver of sustainable development and regional integration.

As part of its mandate and commitments within the SPECA programme and the above project, the UNECE is also contributing analytical support to the intergovernmental discussions among the SPECA countries. The present paper is intended as background material in support of the upcoming intergovernmental deliberations on the adoption of an Action Plan for the implementation of the SPECA Innovation Strategy for Sustainable Development. It aims to bring together and summarise some key insights and conclusions from several analytical reports in this area commissioned by the UNECE.² In this regard, while the paper contains some novel elements, it mostly integrates previous substantive work carried out by UNECE on innovation for sustainable development.

Finally, an important disclaimer. The ambition for technological transformation targeting sustainable development of the SPECA countries is far-reaching and wide-ranging and so are the policy challenges associated with it. Notably it is well beyond the scope and objectives of this paper which is intended to provide background material for intergovernmental discussions regarding future regional cooperation in the area of innovation policies for technological transformation within the UN SPECA programme as such. Therefore, the focus of the paper is intentionally narrowed down mostly towards policy aspects that can be the subject of

² See the list of these reports in the footnote on the front page. Note that the text as well as the illustrative material (tables and charts) that are borrowed from these reports are quoted by referring to the author(s) of the respective report also in the cases when the content contained in the original report may be based on other sources. Only in the cases when this paper includes newly drafted text, not based on the above reports, it may contain references to other sources.

intergovernmental policy discussions and consultations regarding future cross-country cooperation among the SPECA countries within the mandates of UNECE and ESCAP.

2. Why technological transformation is vital for sustainable development in the SPECA region?

The capacity of countries to innovate and harness technological advances to address societal and environmental challenges is a key prerequisite for their sustainable development in the future. For less advanced economies, innovation and technological transformation are largely associated with their capability to adopt, absorb and adapt existing knowledge and technologies into their existing socio-economic structures and processes. For such countries, the opening up of their economies and embracing international cooperation (both regional and global) becomes increasingly important with regard to their potential for future development based on achievements in science, technology and innovation (STI).

Developmental challenges in the SPECA countries

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 (Dobrinsky, 2017). On average, the SPECA countries still lag considerably behind more developed regions and hence face a greater challenge in compliance. On the other hand, during the past decade these countries have made considerable progress in most SDG indicators, thereby advancing fast towards better SDG scores and reducing existing lags.

More generally, most SPECA countries still face a range of developmental challenges: all of them are, albeit to a different degree, still on the road to mature developed economies (Dobrinsky, 2019). In addition, there is significant heterogeneity within the SPECA subregion: it brings together countries with different natural endowments and development levels. Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan are among the resource-rich countries, especially as regards the endowment with hydrocarbon fossil fuels. This is not the case for the rest of the SPECA countries (except for Kyrgyzstan's gold reserves). According to the World Bank classification of countries in the world by their level of GDP per capita, Afghanistan and Tajikistan fall into the low-income group of economies; Kyrgyzstan and Uzbekistan are among the lower-middle income economies; while Azerbaijan, Kazakhstan and Turkmenistan are classified as upper-middle income economies.

Overall, the SPECA economies suffer from a range of structural weaknesses and lags in their technological development (Radosevic, 2021; Dobrinsky, 2020).

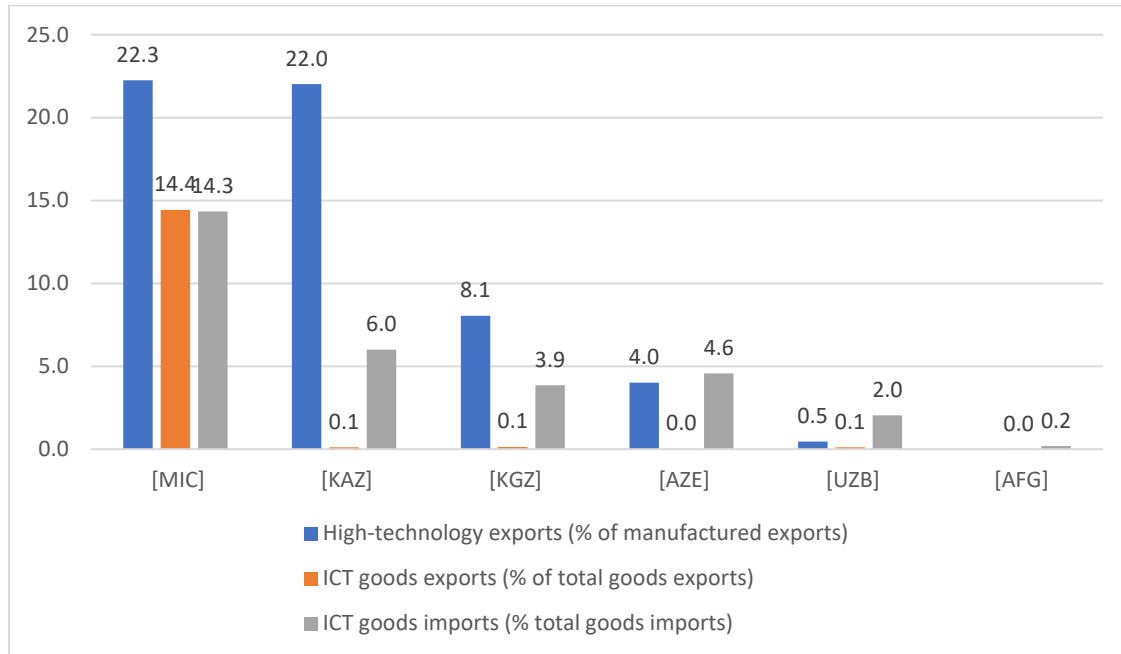
1) The SPECA economies are ‘prematurely deindustrialized’ with a very low share of manufacturing in GDP and exports. Compared to other countries at similar income level, the SPECA countries comprise a relatively industrialized but very much ‘de-manufactured’ subregion, with the major exporting sectors being mainly natural resource-based.

2) Manufacturing in the SPECA countries is characterized by a meagre share of medium- and high-tech industries as reflected in their high tech-exports and trade in information and communication technology (ICT) (Figure 1) and a high share of low-tech industries of low research and development (R&D) intensity - structural features that further explain the limited knowledge intensity and fragile business and public sector R&D. The SPECA economies have a similar share of firms with active R&D to their respective income groups but are intermittently and marginally active. Given that ICT is an essential factor in modernization and technology upgrading of all sectors, a low share of ICT imports indicates significant weaknesses in the diffusion and adoption of new technologies in the economy and society.

3) The SPECA economies are outside of global value chains (GVCs), with the notable exception of resource-based activities: a feature explaining why industries and firms have relatively low production sophistication and management quality. A low number of quality certificates (as in the case in the region) signifies isolation from global value chains and indicates the enormous scope for improvement towards best practice in managing production capabilities. In addition, manufacturing firms in SPECA countries are characterized by a very low degree of product differentiation.

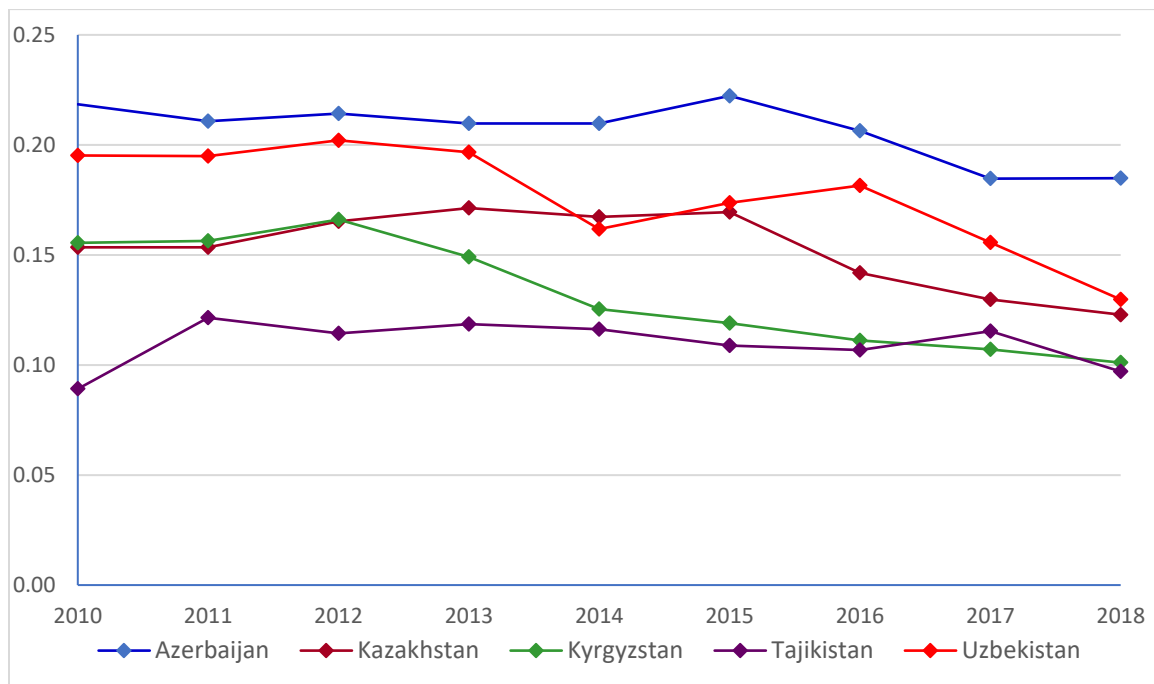
4) The average level of R&D expenditures in the SPECA countries is very low by any standards and considerably lags behind comparator countries (Figure 2), furthermore, it is far below the levels that would be needed to support robust STI development (the more advanced countries can spend more than 3% of their GDP on R&D). Moreover, the general trend observable in the past decade is that of a further relative decline in R&D expenditures, even in the better performing SPECA countries such as Azerbaijan and Kazakhstan. Thus, contrary to stated policy objectives – which usually claim that STI is a policy priority in these countries – the hard data tend to suggest the opposite is true.

Figure 1: High tech-export and ICT trade in SPECA and middle-income countries (MIC), 2018



Source: Radovevic (2021) based on World Development Indicators Database.

Figure 2. Research and development expenditure in the SPECA countries, % of GDP, 2010-2018

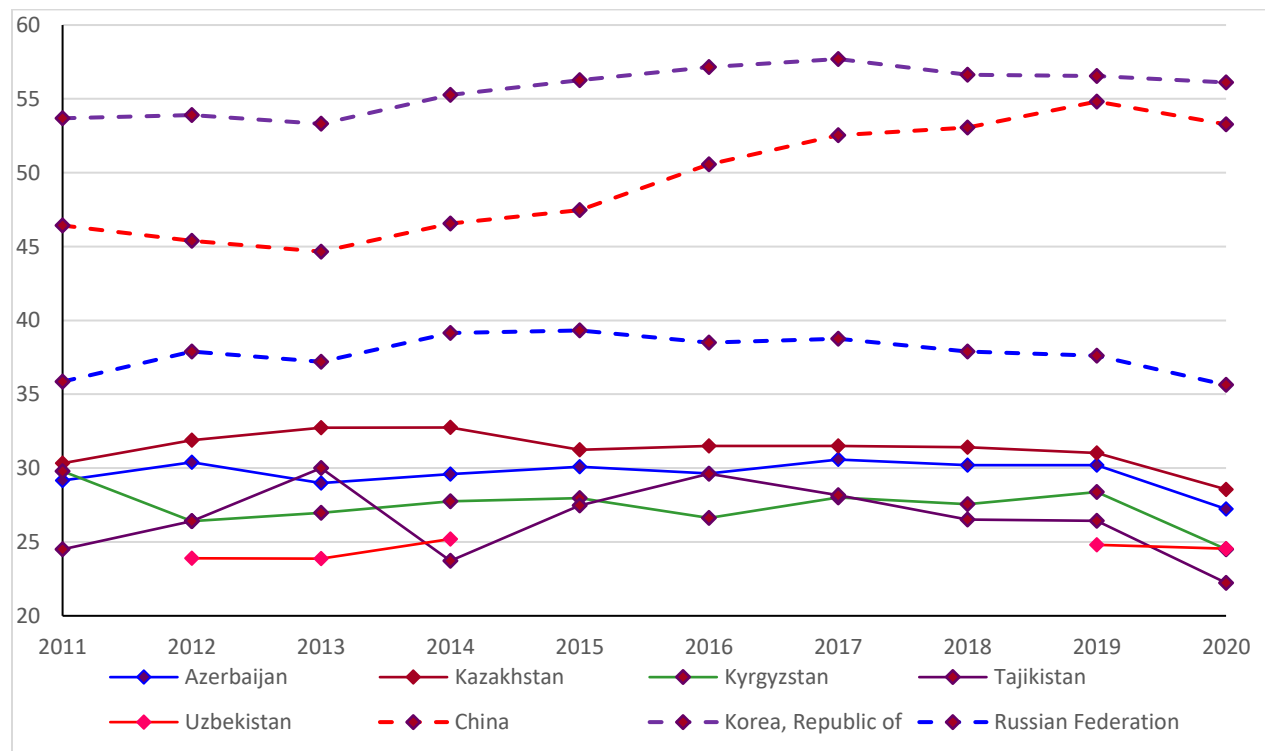


Source: Dobrinsky (2020) on the basis of World Development Indicators Database.

5) The contribution of R&D in the SPECA countries is primarily to facilitate foreign knowledge absorption, often supported by research contracted by firms from university or academic institutes in a range of downstream services like consulting, metrology, testing and problem-solving. Business linkages with higher education are informal but relatively frequent to compensate for a weak market for local knowledge-intensive services.

6) What concerns innovation proper as reflected in the “Global innovation index” (GII) computed by the World Intellectual Property Organization (WIPO), the SPECA countries for which such data are available display only an average to mediocre performance compared to the countries that are considered as innovation leaders (Figure 3). What is more, the dynamics of the index over the past decade (2011-2019) indicate a stagnation of their position compared to the innovation activity in the rest of the world even in countries as Azerbaijan and Kazakhstan which are the best performers in the SPECA region.

Figure 3. Global innovation index (GII) in the SPECA countries, global ranks, 2011-2020³



Source: Dobrinsky (2020) on the basis of World Development Indicators Database.

7) Logistical and ICT infrastructure in SPECA countries (except Kazakhstan) falls below the average level for their respective income levels.

³ The Global Innovation Index (GII) is computed by taking as the average score in two sub-indices, the Innovation Input Index and Innovation Output Index.

Summarizing the current situation in the region, one could say that the drivers of growth in SPECA countries are excessively tied to natural resource-based industries, including agriculture. They are largely outside of GVCs (except in natural resource-based sectors) and have weak innovation systems. Their past dynamic growth driven by the export of commodities and mineral resources is fragile. Industrial activities – which are key for technological advance and transformation – in SPECA are on a declining path since independence, focussed mainly on mining and manufacturing of commoditised, undifferentiated products for the local or regional markets. Economic structure, levels of productivity and patterns of technology and industrial upgrading in these economies lag significantly behind those in high-income economies. The challenge of economic and technological transformation has become even more urgent in the light of the impending energy transition and shift towards ‘green growth’, devastating effects of Covid-19 crisis on global economy, expected impacts of automation and Industry 4.0 on competitive position of these economies.

Gaps in the environment for business and innovation

Under these circumstances, innovation can be a powerful engine for economic development in general and can serve as an engine for structural transformation and diversification of the economies of the SPECA countries. It can also help them to accelerate their regional integration and their integration into the world economy. The SPECA countries have openly stated their ambition to develop and consolidate the national capacity and capabilities to design and implement innovation policies for sustainable development taking into account not only the national context and existing constraints but also recognizing their possible transboundary effects. However, a recent assessment of science, technology and innovation (STI) governance and policymaking in the SPECA countries (Dobrinsky, 2020) based on a survey of local experts using uniform methodology revealed a number of gaps in the STI environment and the policy domain. Below is a summary of some of these findings:

Gaps in the innovation ecosystems of the SPECA countries.

The innovation ecosystems in most SPECA countries are still underdeveloped and many of the building blocks of typical mature innovation systems are either still missing or in their embryonic form. In particular, this concerns such essential elements as:

- Connectivity and linkages. As innovation is the result of the interactions of numerous innovation stakeholders, good connectivity and efficient linkages are essential for the existence of a vibrant national innovation system. While many of the institutional elements

of the innovation systems can be established with government support, their effectiveness will be limited in the absence of interactions in the system. At the same time, the assessment of the national innovation systems of the SPECA countries suggests that all of them still suffer from poor connectivity and linkages between innovation stakeholders which is a major impediment for the invigoration of STI activities.

- Systemic failures. The innovation ecosystem is a complex network which is subject to various systemic failures (such as capability failures, institutional failures, network failures and framework failures) and these are even more frequent when the system is still underdeveloped as it is in the case of the SPECA countries. Thus, poor linkages and insufficient connectivity between innovation stakeholders result, at least partially, from network failures and this ultimately results in the absence of spontaneous, bottom-up collaboration among such stakeholders. The fragmentation of innovation governance (see below) is an example of a coordination failure. These issues are among the serious systemic weaknesses hindering the functioning of the region's innovation ecosystems.
- One related gap in the innovation ecosystems of the SPECA countries is the inadequate coordination capacity of the innovation stakeholders which limits their ability to respond swiftly to both emerging challenges and opportunities. This deficit in coordination capacity is one of the root causes of some systemic failures in the innovation ecosystems.
- Innovative entrepreneurship. The innovative entrepreneur is the central figure in any innovation process and is its main driver. Therefore, the overall state of innovative entrepreneurship to a large degree determines the level and productiveness of STI activity in any country. The evidence available in the national STI gap assessments indicates both low capacity and competence for innovative entrepreneurship as well as low STI capabilities.
- Innovation intermediaries and innovation support institutions. Innovation intermediaries and support institutions facilitate the market's uptake of innovative ideas and entrepreneurial projects and are indispensable for the successful completion of innovative projects. However, as evidenced in the national STI gap assessments, such institutions are virtually absent in some SPECA countries and only exist only in rudimentary form in others. The building of such infrastructure is in itself a long-term process and this will require continued policy support efforts from the various governments.
- Financial systems. While deep and diversified financial intermediation is essential to promote and sustain vibrant innovation activity, the available evidence suggests that the financial systems of all the SPECA countries are still underdeveloped and dominated by the commercial banking sector. This is a serious impediment not only for innovative

development but also to economic growth in general and the ability of these countries to attract FDI, which is an important channel for technology transfer from abroad.

- Seed and early-stage financing. When it comes to financing mechanisms, access to seed and early-stage finance is among the most important factors for the success of innovative startups. The key required feature of such a financing mechanism – and that which distinguishes it from support provided by banking institutions – is that it extends non-debt finance to entrepreneurs in different forms (grants, equity finance, future options, and so forth). Without the support of such a mechanism most, if not all, innovative entrepreneurial ventures are not likely to get off the ground and cross the “valley of death”. Again, the national STI gap assessments suggest that poor access to early-stage finance in the SPECA countries is among the most serious lacunas in their financial systems.
- Limited role of market demand. Innovation emerges as the result of the interplay between supply and demand factors. This is because even if an abundance of supply factors supports innovative activities, such activities will not materialize if the outputs have no markets. Notably in this regard, the domestic markets for R&D and innovative products in all SPECA countries are very limited, making it very difficult for entrepreneurs to realize worthwhile returns on their innovations if they can only sell into these local markets. Moreover, the growth of the vast majority of innovative businesses nowadays are critically dependent on international economic integration and, in particular, on being successfully incorporated into global value chains. Therefore, it is important for STI policy, on the one hand, to support domestic demand but, on the other hand, to also support international linkages and cooperation at all stages of the innovation process, including the commercialization of the process’ outputs.
- Fragmentation of innovation governance. Policy coordination and information exchange between institutions mandated with innovation management are essential for the efficiency of innovation governance. The national STI gap assessments provide evidence of frequent failures in this process due to a lack of information sharing and consultation among institutions. In practical terms, this results in the fragmentation of innovation governance at the operational level.
- The capacity of the public administration. The presence of knowledgeable, capable and efficient public administrations mandated with the design and implementation of STI policy is another key factor for innovation to succeed. However, the national STI gap assessments tend to suggest that this is not always the case in the SPECA countries as very often respondents had grievances regarding the efficiency of many of the involved public administrations.

Gaps in the policy environment and instruments

At the operational level there are serious gaps between (good) policy intentions and the actual practice of innovation management:

- Neglect of the role of competition in allocating public funds earmarked to support research. Although the SPECA countries have made important steps towards introducing competitive elements in their systems for their STI funding, there is much room for improvement in the implementation practices. Areas that need to see such improvement include the funding instruments at all phases of the implementation process and extends to the design of the competitive calls, the organization of bidding processes, the screening and evaluation of bids, the awarding of winners and the monitoring of the implementation of the funded STI projects.
- Gaps in the STI policy support instruments that are being employed in the SPECA countries (Table 1). Instruments that are commonplace in more advanced economies, such as the offering of credit guarantees for innovative small and medium enterprises (SMEs) or grants for full-cycle STI projects from R&D to market, have not been taken on board by policymakers in most of the SPECA countries.
- Availability of seed and early-stage financing. The problem is compounded by the very limited amounts of public resources dedicated to this purpose. As a consequence of this, even in cases where early-stage financing support instruments exist, the outreach of such instruments is very limited and their effect is marginal.
- There is a need for greater public-sector involvement to support innovative entrepreneurship and innovative SMEs. This applies not only to the introduction of new funding instruments and the expansion of the coverage of existing one but also to non-financial support instruments such as providing coaching and business services, supporting both local and international networking, supporting the integration of innovative SMEs into global and regional supply and value-added chains, and so forth.
- Disconnect between publicly funded research and the market. In general, almost none of the SPECA countries apply instruments that cover both the research phase and the later phases of the innovation cycle, namely the transformation of research results into new products and services that reach the market.
- The private sector at present essentially lies outside the scope of the existing instruments in most SPECA countries. There are very few instruments specifically aimed at incentivizing the private sector to pursue STI activities or technological modernization.
- The current policy mix in most SPECA countries includes very few instruments addressing systemic weaknesses and failures in their innovation systems. In particular, there is a need

to introduce new mechanisms that would enable better coordination between the public institutions tasked with innovation governance and better synchronize their functioning.

Table 1. STI policy instruments applied in the SPECA countries

Policy instruments	Afghanistan	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Grants for fundamental research	x	x ¹⁾	x	x	x		x
Grants for applied research	x	x ¹⁾	x	x	x		x
Grants for innovative startups		x ¹⁾	x	x	x ⁵⁾	x	x
Innovation vouchers			x ³⁾				
Coaching programmes for innovative startups		x	x	x			x
Competitions for innovative startups		x	x	x	x	x	x
Incubation and acceleration programmes for innovative startups	x	x	x	x	x	x	x
Entrepreneurship support programmes	x	x	x	x	x	x	x
Credit guarantees for innovative SMEs							x
Equity investment in innovative SMEs (venture financing)			x			x	x
Grants for the commercialization of R&D results	x		x ⁴⁾		x ⁵⁾		x
Tax incentives for R&D and/or technological development in the business sector	x	x ²⁾	x	x	x		x
Budget subsidies for R&D and/or technological development in the business sector		x					x
Subsidized credit for R&D and/or technological development in the business sector		x	x				x
Grants for full-cycle STI projects (from R&D to market)					x		x
Grants for industry-science cooperation in STI projects	x		x				x
Support for industrial clusters	x	x			x		x
STI grants from international donors (World Bank, Asian Development Bank, etc.)	x		x	x	x	x	x

- 1) Exists as a policy option but is temporarily suspended.
- 2) Has been adopted in legislation but implementation is still pending.
- 3) Exists as a policy option but has not been applied yet.
- 4) Has not been applied since 2018.
- 5) Not regular and largely from private sources.

Source: Dobrinsky (2020).

Reconciling the current economic and technological development of the SPECA countries with their declared ambition to pursue innovative development and technological transformation calls for bold new policy approaches that might enable the countries to move on a fast track of technological catch up that would also enable their pursuit of the SDGs.

3. A new innovation paradigm for the SPECA countries

The SPECA countries' dependence on mining and exports of primary resources implies a higher propensity to boom-and-bust economic cycles (Dobrinsky, 2019). Thus, during the decade of the 2000s, the resource-rich countries in the subregion benefitted from favourable world market prices for energy resources and recorded high rates of growth. However, this growth was not sustainable as it almost entirely relied on resource exports in favourable market conditions. This period is now over and in more recent years one can observe the negative consequences of the excessive dependence on hydrocarbon exports. Moreover, the windfall profits collected by the resource-rich economies in the boom period translated into something similar to rent addiction and triggered excessive public spending. These countries have recently been facing the challenge of a painful downward adjustment in public spending and real personal income. Thus both the resource-rich and those that are not so well endowed need to establish multiple engines of growth by pursuing appropriate diversification strategies tailored to their local context.

Catching up through technology-based innovation

The broadening of the economic base requires in the first place the modernisation and expansion of the manufacturing sector. However, this will be a long process which needs to be undertaken in carefully planned steps and should be backed by the countries' existing comparative advantages. Diversification and modernisation of the SPECA economies will only be successful and sustainable if it is based on innovation and technology-based restructuring.

The SPECA countries belong to low- and middle-income economies whose firms by and large operate as technology latecomers and laggards (Radosevic, 2021). Accordingly, the nature of these economies' innovation processes is significantly different compared to those in high-income economies. Innovation processes in SPECA countries have in recent years been focused on the adoption and assimilation of foreign technology. R&D is primarily extramural, i.e. conducted in public R&D organisations and firms face quality and management capability constraints and a lack of highly skilled labour. Firms are concerned with productivity improvements and how to improve manufacturing and services capabilities to meet export markets' requirements. While innovation activities in advanced economies are R&D focused, they are much

more focused on downstream activities in low- and middle-income economies. R&D plays a role in isolated segments of the industry and is primarily important to improve firms' absorptive capability. This feature of the economies of SPECA countries has important policy implications and calls for a much more significant role of proactive industrial policy than conventional horizontal and R&D-based innovation policy. In other words, it calls for technology upgrading approach going beyond the R&D for sustainable development approach.

Furthermore, the SPECA economies are, apart from resource-based sectors, poorly integrated into the global economy and global value chains. Hence, accessing supplier chains and enhancing local firms' technology upgrading is the challenge. Almost all SPECA countries have pockets of excellence in R&D or ICT services. However, it remains to be seen whether these pockets of excellence can represent sources of future growth of employment and value-added. In macroeconomic (employment and value-added) terms, they are still marginal. Hence, there is a need to broaden the internationalisation approach and explore how other sectors can be involved in global value chains. This means using international supply chains as a mechanism of learning and leverage to local firms and going beyond the traditional organisational and policy boundaries between industrial, innovation, trade, and FDI policies.

Emerging economies such as the SPECA economies face both specific challenges but also offer opportunities to innovation entrepreneurs. In particular, as noted above, this environment offers opportunities for catch-up and productivity growth on the basis of knowledge and technology transfer. Innovation based on adoption and adaptation (mostly through importing) can help address some of the challenges that innovators face in low-income countries and mitigate some of the associated risks. When adopting and adapting on the local market a product or technology from abroad, the time horizon is much shorter compared to an invention as some of the essential phases in the innovation process can be 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 which can be produced with economies of scale abroad. Plus, the innovation is less likely to be done by start-ups with no track record, and more likely by established firms with an established record of revenues, expenditures and credit history.

The notion of innovation is itself 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 (Dobrinisky, 2017). 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 2).

Table 2. Innovation in the 21st century: an evolving concept

Forms of innovation		Rationale; objectives	Target market /segments	Entrepreneur	Funding
Business innovation (product; process; organisational; marketing)	Digital Innovation and transformation	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 innovatio		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: Dobrinsky (2017).

Quite 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 that can exert a transforming effect on the patterns of production and consumption patterns within and across sectors. Missions are both a means of setting the direction of economic growth and a vehicle to achieve the goals.

The ongoing universal proliferation of digital technology in all facets of economic, social and daily life has also led to radical changes in the innovation process itself. This prompted the emergence of the term digital (or digitally enabled) innovation. It refers to the use of digital technology in all aspects of the innovation practices, often leading to the radical transformation of these practices. In a more narrow sense, digital innovation refers to innovation practices enabled by digital technology platforms that act as a new environment making it possible for innovative entrepreneurs and firms to develop new products or services.⁴ In turn, the emerging digital ecosystem offer new opportunities and capabilities not present in other environments thus stimulating and enabling digital innovations by the parties connected through such networks.

The new forms of value creation enabled by digital technology and digital platforms often lead to profound changes in the purpose, means and identity of the organizations innovating in

⁴ Raffaele Fabio Ciriello, Alexander Richter and Gerhard Schwabe, “Digital Innovation”, *Business and Information Systems Engineering*, 2018, No. 6.

this manner.⁵ Therefore it is considered that digitally enabled innovation has an enormous transformative potential. In consequence many organizations actively engaged in such innovation on the basis of newly acquired dynamic digital capabilities often undergo a profound digital transformation of their operational and governance structure. Digital transformation revolutionizes business activities and processes creating a virtuous circle with digital innovation becoming a fundamental driver of new business models and markets.⁶

While digital innovation and transformation can be regarded as separate forms of innovation, they are also cross-cutting developments that affect profoundly all other forms of innovation (Table 2). Basically, in the digital age all of the more traditional forms of innovation acquire new, digital features that transform the innovation process associated with them.

Digital innovation can play a key role for the technological transformation of the SPECA countries for several reasons. Most of these countries have good tradition in ICT education and training and have a pool of human capital that is vital in this area. Some SPECA countries (Azerbaijan, Kazakhstan) have already reached a good level of internet use which is another favourable factor. Importantly, digitally enabled innovation is not very demanding on fixed investment which is important for low- and medium-income countries. As noted above, most SPECA economies have already developed pockets of excellence in digitally enable innovative services.

New industrial policy targeting innovative development

Against the background described above, one could consider a new innovation paradigm for the SPECA countries based on what has come to be known as “new industrial policies”, as opposed to traditional or “old” industrial policies (Radosevic, 2021).⁷ The term “new industrial policies” refers to a wide class of contemporary policy approaches that are pro-active and focused on innovation and technology upgrading in an inter-sectoral context. These policy approaches:

- recognize that the ultimate limits to growth and the relevant solutions are not known ex-ante;

⁵ Daniel A. Skog, *The Dynamics of Digital Transformation. The Role of Digital Innovation, Ecosystems and Logics in Fundamental Organizational Change*, Umeå 2019.

⁶ OECD, *Digital Transformation in the Age of COVID-19. Building Resilience and Bridging Divides*. Digital Economy Outlook 2020 Supplement. Paris, 2020

⁷ The notion of “old” industrial policies is associated with the import substitution policies of the 1950s-1970s that were practised in many developing economies and the industrial policies based on the notion of “national champion” practised in many developed economies. The former centrally planned socialist economies had extreme import substitution regimes, and implicitly promoted industrial policy on a large scale.

- are market-friendly because they show respect for comparative advantages and export transformation; guided by the perceptions of not only market failure, but also system failure;
- are centred around the private sector and innovation ecosystem actors to enhance their collective action;
- assume either explicitly or implicitly some elements of experimentalist governance.

A conversion of new industrial policy features into the SPECA context generates several implementation principles which should be considered when designing and implementing industrial policy measures. In the SPECA context, such a policy approach would primarily target the upscaling of existing or emerging bottom-up initiatives that can potentially increase sustainable growth and technology upgrading. It should be created and implemented in coordination and co-production with affected parties. Policy in this perspective is about facilitation and moderation of self-organisation activities.

Learning in policy requires experimentation, and thus pilot projects are its essential mechanism. The government's role in contributing to and facilitating collective action on innovation remains essential. However, its involvement in the implementation of various policies should match its policy implementation capacities. The policy capacity across SPECA economies varies but on average does not seem to be at the required level for effective industrial policy implementation. This further urges the use of pilot projects where risks and failures are accepted and where technical risks are clearly differentiated from strategic risks and use of “diagnostic monitoring” or early warning system when results do not seem likely.

In stylized form new industrial policies applied in the context of the SPECA region would have the following features (Radosevic, 2021):

- They are pro-active and focused on innovation and technology upgrading in an inter-sectoral context. Industry boundaries are not defined through products, but rather ‘sectors’ and where ‘activities’ correspond to ‘capabilities’.

The selectivity of the new industrial policies is based not on industries defined through sectoral or product classification, but on applications of new technologies in any “sector” or in a cross-sectoral settings (e.g. drones in agriculture).

- They are ‘smart’ because they recognize that the ultimate limits to growth and the relevant solutions are not known ex-ante; the new industrial policies open freedom to experiment.

New industrial policies assume that the ‘ultimate’ constraints to growth need to be ‘discovered’ through the process prompting an understanding of these constraints. Unlike the old-style industrial policies, new industrial policies recognize that the government does not possess the necessary information for the right decision. Equally, firms do not have perfect foresight about

the opportunities and constraints they face in the long-term. All views are partial, and not one actor possesses a panoramic view of an industry. In that respect, all new industrial policy approaches are smart as they recognise the inability of policy and market actors to have perfect foresight. Cooperative public and private sector efforts to work jointly on technology upgrading of individual sectors and firms are more important than sectors that may be chosen as priorities.

- They are ‘market-friendly’ because they show respect for comparative advantages and export transformation.

New industrial policies are designed to work with the market rather than against the market. Reliance on the market as an allocation mechanism at any stage of development and recognising a facilitating role of the state in industrial upgrading are central to new industrial policy approaches. Central to this is the idea that policy should enhance latent comparative advantages of the economy and using ‘soft’ policies to embed FDI and GVC as levers and linkages mechanisms for domestic technology upgrading.

- They are guided by the perceptions of not only market failure, but also system failure.

In the context of new industrial policy, the distinction between market and system (coordination) failure is quite important. What may seem like market failure may be coordination or system failures due to lack of knowledge of the potential market and technological opportunities which cannot be easily recognized. However, the government's role in such cases is not to replace the market but to enhance private sector coordination by establishing missing intermediary organizations or mechanisms of “non-market articulation of markets”. From this “market enhancing” view, the government's role is to facilitate the development of private sector institutions that can overcome these failures rather than solve the coordination problem by itself.

- They are centred around the private sector and innovation ecosystem actors; they do not resolve coordination failure but enhance collective action.

The new industrial policy aims to increase the private sector's capabilities to cooperate in new technological areas, as opposed to some of the “old” industrial policy mechanisms as subsidies to individual enterprises, which ultimately will not induce cooperation between firms and enhance interdependencies, thus preventing the formation of the new microsystems of innovation like clusters or value chains. The scope for government action will largely depend on the degree to which the private sector has technological capabilities and the extent to which there are intermediaries that can facilitate collective activities searching for new technologies or new markets.

- They assume either explicitly or implicitly some elements of experimentalist governance.

New industrial policies require “coordinated decentralization” as initiatives are left to a variety of actors involved in implementation at national and local levels and across different

economic activities. The actors' freedom to experiment with different ways to solve technological problems is at the core of new industrial policies. Another central idea of such policies is to forge flexible forms of strategic collaboration between public and private sectors sharing risks and responsibilities.

When it comes to policy processes, to be effective new industrial policy requires "rich institutional context" and new forms of government. Thus, an institutionally "rich" system of government-business relations and self-organizing mechanisms within business and industry is required to correct both government and market failures. Since the policy outcomes are inherently unknowable ex-ante, it is crucial to get these policy processes right.

Finally, when assessing the role of innovation for technologically driven transformation within the SPECA countries' policies targeting the SDGs it is necessary to take into account all varieties of innovation (Table 2). 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. If we juxtapose this wide-ranging agenda (containing 17 MDGs and their 169 targets) with the broader understanding of innovation, it is clear that there is a truly wide scope for innovative ventures and initiatives in pursuing the SDGs (Table 3).

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 new industrial and innovation policy. Furthermore, 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.

New industrial and innovation policy is 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 network/coordination failures and capability failures. Innovation is not the activity of a sole inventor but collaborative activity par excellence. Recognizing the importance of such a systemic approach requires to identify the systemic failures among firms and between firms and public organisations approach that inhibit the innovation process.

Table 3. 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: Dobrinsky (2017).

Overcoming these failures situation requires public sector officials to work closely with firms to identify sector or technology-specific challenges which can be addressed only through

collective action with the state emerging as a facilitator or broker to overcome barriers to cooperation.

Extending this conceptual framework to the Agenda for Sustainable Development 2030, one could conjecture another rationale for new industrial and 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, 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 could form the the basis for mobilizing private sector participation in the project.

4. Upgrading the innovation support infrastructure

The innovation support infrastructure is part of the national innovation system which includes a variety of institutions (such as service providers and intermediaries) that offer different support services to innovative entrepreneurs and firms aimed at helping the latter solve various problem that arise in the innovation process. The innovation support infrastructure includes a range of institutions, including business incubators, science and/or technology parks, innovation centres, fab labs, accelerators/accelerator programs, etc. Such institutions play a vital role in the innovation process as innovative entrepreneurs and firms often lack the capabilities to address and solve the numerous problems that arise on the way to the market. In this section we outline some guiding principles for upgrading the innovation support infrastructure in the SPECA region, focusing on one specific type of support institutions – business incubators.

The innovation support infrastructure in the SPECA countries needs to be enhanced

While the SPECA countries have already set up different enterprise and innovation support institutions, some significant gaps remain for this infrastructure to play a systematic, catalytic role in enabling and supporting broad experimentation with new ways of creating both value and the private sector's absorptive capacities to underpin it. At present, the situation with innovation support infrastructure varies considerably across the SPECA countries (Table 4).

Table 4. Overview of selected innovation support institutions in the SPECA countries

Country	Business Incubators	Techno Parks and Innovation Centres
Afghanistan	Ibtikaar Incubator (for technology start-ups); Founder Institute Kabul (incubation programme); TechNation (business incubation and acceleration)	TASEES Center for Innovation and Entrepreneurship; Business Innovation Hub of the American University of Afghanistan; StartUp Grind
Azerbaijan	INNOLAND Incubation and Acceleration Centre; Social Innovation Lab (SIL), BBF, Youth Inc, Idrak Technology, the Innova Startup Factory; Lotfi Zadeh Technology Centre	High Technologies Park (under the National Academy of Sciences); Techno Park of the Baku Engineering University; Techno Park of the West Caspian University, the Eazi Startup Centre at the Azerbaijan State Oil and Industry University; ADA University Innovation Lab (ADAIL); Barama Innovation & Entrepreneurship Centre
Kazakhstan	QazTech Ventures, Astana Hub (incubation and acceleration programmes); Nazarbayev University Research and Innovation System (NURIS); MOST	International Techno Park of IT Startups "Astana Hub"; Park of Innovation Technologies "TechGarden"
Kyrgyzstan	Business Incubator (private) John Galt; Accelerate Prosperity in Kyrgyzstan (accelerator); Innovation Center of Kyrgyzpatent (to open in 2021); 11 university-based business incubators.	TP of the State Technical University of Rassakov; TP of the State University of construction, transport and architecture; TP of Technical University of Osh; Innovation Centre of KyrgyzPatent;
Tajikistan	State Business Incubator; Accelerate Prosperity in Tajikistan (accelerator)	"Fanovar" TP of the State Technical University (Dushanbe); TP of State Technical University of Academic Osimi; Technopark of Russian and Tajik University
Uzbekistan	Incubation centres within four universities in Tashkent, i.e. Polytechnical University, State Economic University, Inha University, and Amity University; IT Park Uzbekistan; Business Compass	Yashnabad TP (Tashkent); IT Park Uzbekistan

Source: UNECE (2021).

Some countries, such as Afghanistan, are only now considering the establishment of institutions such as technology parks, business incubators and technology transfer offices. In contrast, both Kazakhstan and Azerbaijan have established extensive networks of well-functioning innovation support institutions with the latter having an operational High Technologies Park along with 5 industrial zones/parks for large conglomerates and 4 industrial estates focused on SMEs. In addition to these, Azerbaijan has three technoparks specialized in providing support to innovative SMEs and its public sector operates two functioning business incubators and five more are expected to open in the near future. This is all in addition to the numerous university-based and private business incubation institutions currently operating in the country. Kazakhstan also has an extensive network of innovation support institutions and activities that focus their efforts on different phases of the innovation process. These include incubation and acceleration programmes that are administered by innovation support institutions such as the International Technology Park for IT startups “Astana Hub”, QazTech Ventures, Astana Business Campus under the Nazarbayev University along with a number of others. Several further initiatives are underway, such as university-based technoparks and business incubators in Kyrgyzstan and Tajikistan, an Academy of Science-based technopark in Turkmenistan and several private sector-run business incubators.

Business incubators are a key driver of innovation

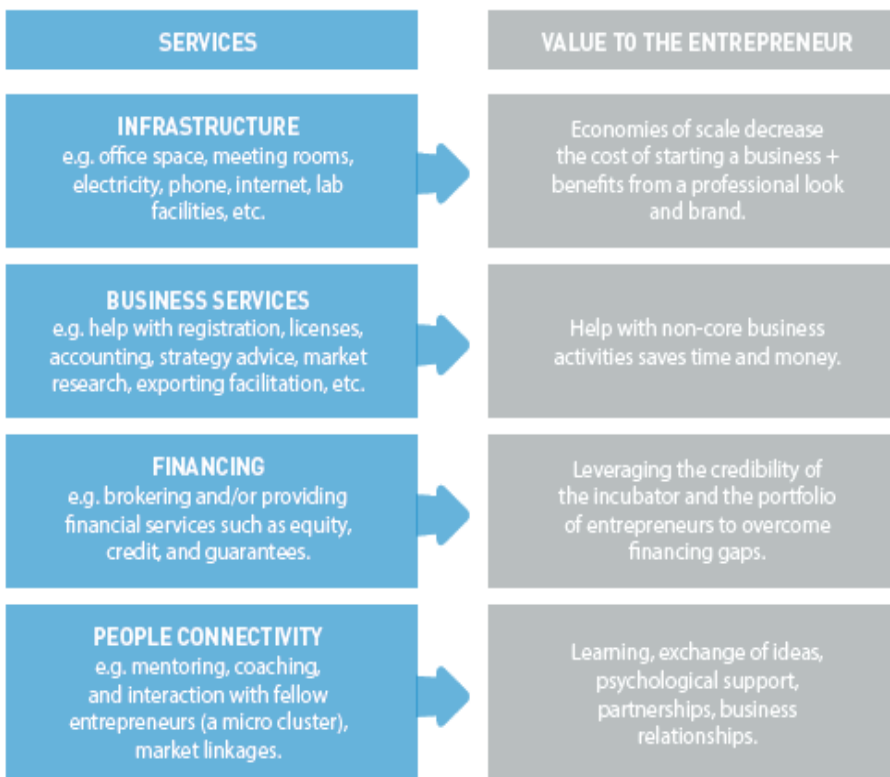
Within the variety of different innovation support institutions, business incubators play a special role, as such institutions are aimed to provide vital support to innovative entrepreneurs at the most critical early phases of the innovation process (UNECE, 2021). Business incubators can, if structured effectively and in coordination with other support measures, be one of the most important tools to support the initial stages of the life cycle of innovative initiatives – pre-seed, seed, start-up, and scale-up. In emerging economies such as the SPECA countries, the potential of business incubators to increase economic competitiveness and tackle various social challenges such as unemployment and poverty is enormous. At the same time, this potential is limited by a number of challenges associated with poor infrastructure development, including ICT, limited private sector R&D, lack of incentives to start a business, gaps in accessing finance and issues in human capital development.

The principal objective of business incubators is to help and support innovative entrepreneurs at the very early stages to shape their innovative idea in a way that would enable its advance forward in the innovation process. Incubators accomplish this mainly through targeted

services such as low-cost office space and facilities, coaching and training, networking, and support finding sources of finance, all of which create value to the entrepreneur (Figure 4).

The range of services provided by business incubators is extremely wide and can range from leasing premises to financing the projects of their clients. The range of services provided is determined by the specifics of each business incubator, including the duration of its existence, industry affiliation, personal characteristics of the management and many other factors. The most demanded service among residents is assistance at the initial stage of project implementation, especially in connection with help in writing a business plan, developing a business concept and so forth. Other services include assistance in the commercialization of innovative outputs, the provision of administrative and office services, as well as training and staff development. In addition, services such as assistance in finding partners and providing high-speed Internet access are also very important among residents of business incubators.

Figure 4. Areas of support to innovative entrepreneurs provided by business incubators



Source: UNECE (2021).

The main types of services provided at different stages of business incubation include the following (UNECE, 2021):

- Lease/sublease of incubator premises to SMEs;
- Postal services and administrative support;
- Consulting services, educational services (general and specialized);
- Preparation of constituent documents and registration of legal entities;
- Centralized accounting for start-up entrepreneurs;
- Marketing services, internet marketing;
- Assistance in marketing research;
- Search for investors and mediation in contacts with potential business partners;
- Organization of business events, networking, presentations, conferences;
- Support in solving administrative and legal problems (drafting model contracts);
- Purchase and provision of information on topical issues (specialized printed materials);
- Structuring investment transactions;
- Prototype testing - testing an idea or minimum viable product (MVP) of a future product using potential customers;
- Prompt legal assistance;
- Provision of coworking services;
- Provision of licensed types of educational services.

Business incubators for industrial and innovative purposes also provide extra types of services for existing companies such as:

- Merchandising expertise; services for the introduction of export-oriented start-ups to foreign markets (soft landing);
- Franchising services;
- Assistance in organizing and optimizing production processes and so forth;
- Evaluation of start-ups by the incubator's expert council;
- Search for accelerators, including foreign entities;
- Conducting a technological audit;
- Microfinance assistance;
- Business and property valuations;
- Preparation and packaging of projects to join local and international accelerators;
- Assistance in obtaining loans and bank guarantees.

Business incubators could also have an additional focus on specific social groups such women-entrepreneurs, youth or disabled people and conduct dedicated events to support them. Such a focus is important and relevant for the pursuit of the SDGs by the SPECA countries. To be

truly successful, i.e. have its residents grow, develop and eventually exit, a business incubator needs to ensure that the channels of communication remain open between residents and business communities, venture investors, business angels, service companies providing services to businesses as well as other organizations forming a part of the entrepreneurship support infrastructure. Business incubators are encouraged to consider introducing paid services such as entrepreneurship courses and services for large businesses and expanding their range of technological services to include video conferencing, assistance in organizing crowdfunding/crowdsourcing/ crowdinvesting, software testing and similar services.

The effectiveness of business incubators depends on a well-functioning market economy underpinned by a favourable business environment conducive to experimentation with new ideas and innovation. Building on the progress already achieved by the SPECA countries, enhanced structural reforms to further improve the business environment are a priority and would enable business incubators to fulfil their potential to support the development of new ventures. To be effective, business incubators also require skilled and suitably resourced staff with a solid understanding of the market and the nature of innovative ventures, as well as realistic and sustainable business model in line with incubator's goal.

As already noted, in emerging economies as the SPECA countries much of the potential for innovation to drive sustainable development lies in absorbing and adapting existing ideas, technologies, and business models that have proven their worth in other contexts. However, for this type of innovation to take place, the SPECA countries need to ensure they have sufficient local capabilities for absorption, in particular, education and labour force skills, frameworks for technological diffusion and adaptation, as well as policies promoting demand for innovation at the national level (such as incentives to stimulate local innovative entrepreneurship, innovation enhancing public procurement, industrial innovation, etc.). Such adoption and adaptation of new products, services and processes into the local market have already proven to be instrumental in triggering private sector development, improvements in productivity, better working conditions, economic diversification, international economic integration and the growth of social capital in other similar environments. Such success could, with continued effort, be replicated throughout the SPECA countries and yield significant benefits.

In this regard, the capacity of enterprises to absorb, adapt and disseminate knowledge is of paramount importance and fostering innovative entrepreneurship should be high on SPECA countries' policy agenda. Innovative entrepreneurs can experiment with new ideas, create new markets and contribute to structural change in the economies in which they operate. However, for such entrepreneurs to emerge a number of preconditions are required. Governments should ensure an overall enabling environment for businesses of all types and sizes while simultaneously creating incentives for investments and entrepreneurial ideas to be realised. Therefore, the SPECA

countries need to develop strong and well-functioning innovation systems with functional industry-science linkages for the commercialisation and diffusion of knowledge, efficient support infrastructure to support innovative start-ups and enterprises. Investment in human capital development will be equally important to foster innovative activity.

Some guiding principles to develop effective business incubators in the SPECA subregion

Drawing on the best international practice in the area of business incubators and the assessment of the current situation of innovation support infrastructure in the SPECA countries, the following guiding principles to develop effective business incubators in the region could be put forward:

1. During the strategic planning process to develop business incubators in a country, city or area, it is essential to:

- Analyse macro-economic factors and framework conditions (regulatory environment, entrepreneurship support institutions, economic constraints and opportunities, socio-cultural factors).
- Analyse micro-economic factors (economically active population, demand for local products, number of local entrepreneurs, business support infrastructure, access to finance, higher education institutions).
- Assess the capabilities and resources available to an organization that decides to create a business incubator (management motivation, availability of qualified personnel, sources of initial investment and revenue).
- Define a business model for the incubator and its sustainability objectives.
- Identify the objectives of the business incubator and intended impact on regional development to facilitate the monitoring of business incubator activities.
- Determine the sectoral specialisation.
- Define the type of business incubator (open or closed; industrial business incubator, innovative incubator, ICT incubator, service business incubator, or mixed-type incubator).
- Develop the package of services to be provided.
- Determine the organizational structure and legal status of the business incubator.
- Choose a location and design the layout and premises.
- Develop a promotional campaign to attract potential residents.

2. For state-supported business incubators, the following aspects should be considered when formulating policy:

- Admitting residents on a competitive basis.
- Complying with any applicable legal restrictions on the participation of SMEs of certain sectors in the incubator programme and ensuring relevant compliance standards are respected.
- Providing business incubator premises for lease (sublease) to residents on preferential terms.
- Limiting the duration of residents' stay in a business incubator.
- Setting special requirements for the business incubator premises (square metres, the share of the total area for residents, the number of equipped workplaces, etc.).
- Making sure that business incubator-managing organizations meet certain requirements and are equipped to fulfil a wide range of functions.
- Establishing a board of trustees.
- Ensuring that the financial model of a state business incubator is clearly defined and transparent.
- Carrying out an external assessment of a business incubator's performance annually by an authorised organization.

3. For a university business incubator, the following specific aspects should be taken into account when formulating policy:

- The legal status of university business incubators depends on the status of the university (either state or private) and its internal regulations. A university will typically decide on the legal form its business incubator will take, while also considering possible additional external requirements in the case of public universities (such as public procurement rules, ownership of intellectual property, restrictions on outside employment or entrepreneurship activities).
- According to the determined goals and resources available, a business incubator could be closed (accessible only for university students and teachers) or open to all start-up operators.
- In most cases, business incubator services, including office space and public laboratories, are provided for free.
- University business incubators provide a certain package of functions and services (starting from project selection, training programmes, mentoring, assistance to attract funding, monitoring and support with first sales and scaling up).

- The management staff of a university business incubator is usually limited and include a director (manager), deputy heads, managers of work with residents, an administrator and subject specialists.
- A business incubator usually has a coordinating vice-rector to facilitate the functioning of the incubator (a decision that depends on the type of business incubator chosen).
- The financial model of a university business incubator will depend on the university's status. Often, the business incubator funds come from the university budget, grants, service contracts, sponsorship and university endowment fund.
- For greater efficiency and synergies, business incubator entrepreneurship programmes should be integrated into the university curriculum.

4. To build an effective business incubator programme, the following elements are important:

- Establishing a monitoring mechanism of the business incubator activity to systematically ensure that the business incubator meets the set objectives and the needs of incubatees (including potential incubatees).
- Determining the range of services to be provided depending on the type of business incubator.
- The service package can include lease/sublease, consulting services, educational, investor search and intermediation in contacts with potential business partners, prompt legal assistance, provision of co-working services, etc.
- Designing and providing effective support to incubatees on fundraising, mentoring, coaching and networking (supporting from start-up creation and first sales through to the maturity stage).
- Ensuring business incubator capacity (such as human and financial resources) to provide for effective pre-incubation programme and post-incubation support, if those make part of the business incubator activities.
- Building on the monitoring results of business incubator activities when deciding on strategic development of business incubator taking into account the potential impact on regional development.

5. How to enhance industrial and innovation governance in the SPECA countries?

In the framework of new industrial and innovation policy, governance refers to the decision-making rules affecting the innovation process and the interactions between innovation

stakeholders taking and implementing such decisions. It has both a formal component related to existing legislation, regulations and other policy decisions and an informal or behavioural component, which is related to the incentives and motivation of innovation actors. Innovation governance includes both public sector bodies tasked with innovation management and private sector innovation stakeholders (businesses, financial institutions, innovation intermediaries, etc.) whose behaviour is driven by incentives and motivation.

One specific public sector governance function is the coordination of policy design and implementation. The need for this arises from the mostly horizontal nature of innovation policy which affects many actors at a similar level of governance. The effectiveness of policy coordination also depends on the design of the overarching elements of innovation policymaking, and on the existence of efficient linkages within the innovation ecosystem that enable (or hinder) interactions among them.

In view of these specificities, industrial and innovation policy requires developed institutional capabilities that go beyond government capacities and require the ability to engage with the private sector, coordinate across several public agencies and ensure continuity of policy whose effects are usually felt beyond the electoral cycle (Radosevic, 2021). Some of these capabilities are the outcome of different historically rooted roles of the state and business in national economies and cannot be simply built by a small team of “modernisers” or reformers. Accordingly, good industrial and innovation governance required the development of specific institutional capacity and capabilities:

- Policy coordination capabilities

Institutional capacities for innovation policy are not confined to the administrative capabilities of governments. The state cannot be useful in industrial policy as an autonomous entity without being enmeshed in rich knowledge networks with the private sector through which it can enter a dialogue about growth challenges. Hence, policy coordination capabilities are as crucial as in-house government capacities. Capacity to coordinate actions across public sector agencies and effectively engage in collaboration with private sector actors is essential to successful policy outcomes.

The bottom line is that the political economy of state – business relationship plays a decisive role in innovation and industrial policy outcomes. Implementation failures are not only technical and operational but also political. So, the critical challenge of implementation is how to align the incentives of the stakeholders who have the power to decide with the incentives of society? In essence, this means that thinking about innovation and industrial policy in a new way requires understanding the ‘politics of policy’.

- Building coalitions for technology upgrading

In natural resources-based economies as are SPECA, this issue is particularly relevant due to great rent-seeking opportunities and unproductive use of rents. The underlying political economy dimension of industrial policy in SPECA subregion is about building coalitions for technology upgrading. The issue is an extreme version of the middle-income trap politics where the challenge is about investing in upgrading-related investments that require extensive information, negotiation, monitoring, and short-term costs, but whose benefits would emerge only in the medium or long term.

Here we can say very little about the ‘politics of industrial policy’ in SPECA subregion as in our analysis we consider it as ‘external’ factor. However, the politics of industrial policy may alter with changes in the external environment such as, for example, the unfavourable commodity prices which are forcing major stakeholders to seek alternative sources of sustainable growth. In such a condition, the critical policy constraint is the policy capacity or broader institutional capacity of government and non-government actors to promote diversification and experiment to find ways out of protracted crises. The key is that government capacity cannot be built without attempting such policies, i.e. through experimenting and learning by doing.

- Institutional capacities for the implementation of innovation and industrial policy

The assessment of the institutional capacities for implementing new industrial policy is indispensable to check whether the proposed policy measures can be carried out as intended. The capacities for implementing new industrial policy can be grouped into strategy-setting capabilities; policy coordination capabilities, implementation capacities – operational, technical, political; and monitoring and evaluation capacities. The core of the institutional capacities for new industrial policy is implementation capacities – operational, technical and political.

- *Technical capabilities comprise all the knowledge and expertise required to implement industrial policy instruments.*

Examples of technical capacity are selecting the best business plans, the design of R&D tax incentives, or managing cluster development.

- *Operational capabilities*

These include managerial skills, that is, the ability to run an organization with high professional standards, efficiency and results.

- *Political capabilities include securing political support to accomplish the mission and safeguard against political capture).*

The key to political capability is to ensure the continuation of the support of the relevant authorities. In transition economies, the required technical capabilities to implement individual policy measures are much less available than in developed countries. When technical abilities are

lacking, agencies or ministries must collaborate with the external public and private organisations that can provide such services.

- Monitoring and evaluation capacity and capabilities

The quality of innovation and industrial policy is significantly determined by how well monitoring and subsequent retrospective evaluation are organized. This is the only way to embed experiential learning into the policy. In this respect, monitoring and evaluation are essential aspects of the new industrial policy's institutional setup and implementation capacity. In emerging economies, monitoring and evaluation are not developed and even when such units exist, they are often understaffed, lacking technical capabilities, and having low stature in the industrial policy machinery. Very often, monitoring and evaluation are adequately done only when funded as part of international organisations programs.

Ultimately, it is critical to assess whether in deciding on specific policy measures, governments have assessed their institutional implementation capacities and primarily whether they have assessed their operational, technical and political implementation capacities. The absence or presence of coordination capabilities within public or private sectors will determine the appropriateness of specific policy types. Horizontal policies will be more appropriate as compared to vertical when public-private coordination is weak. Also, single agency-based approaches will be preferred when intra-public sector coordination is undeveloped.

The government capacity does not include only administrative capacity to design and implement policy but also the capacity to coordinate actions across public sector agencies and effectively engage in collaboration with private sector actors. In states with weak institutional capabilities, policy overreach is a real possibility, therefore the challenge is: i) how to design low-cost policy measures, ii) how to establish communication with local entrepreneurs, and iii) how to ensure both incentives for technology upgrading and performance requirements.

- Resolving the experimentation vs accountability trade-off

The final challenge is how to reconcile the experimental nature of innovation policy with the requirements for accountability of public policy. Experimentation in new industrial policy is about creating various policy solutions that may fit the local context. This approach stands in stark contrast to the idea of the universally relevant policy packages which cite insufficient implementation capacity as the main challenge for the success, disregarding local relevance. There are several distinct approaches to experimentation in innovation policy, each with their advantages but also noticeable defects. The underlying issue, however, is a disconnect between the rhetoric which calls for a more experimental public sector (implying acceptance of failures associated with

the high risk of innovation activity), and the reality of a public sector compliance culture that is intolerant of mistakes and failure.

In this context, the ultimate solution is to rely on pockets of excellence in public administration and entrust them with designing and implementing industrial policy programs. However, such an approach is difficult to fit into the conventional accountability rules of public policy. Its short-term aim is humble: to accelerate what already exists, starting from pockets of excellence in private and public sectors. The long-term objective is more ambitious with the aim to create a critical mass of capabilities and interactions that can be enlarged to produce a desired macroeconomic effect. However, ‘betting’ on individual pockets of excellence means also readiness to incur some dramatic losses which may undermine the overall idea, challenging conventional public policy accountability.

Some specific forms of industrial and innovation policy may also require the development of some additional specialized capacity and capabilities. Thus the governance of ‘missions’ (in the context of mission-oriented innovation) in complex socio-economic systems engaging a multitude of stakeholders from different domains, necessitates participatory approaches in the sense of the commitment and engagement of the various economic actors jointly in the pursuit of common objectives such as the SDGs.⁸ Such participatory governance also require particular problem-solving, negotiating and risk-sharing skills in the search of mutually acceptable solutions.

This all suggests that there are no easy solutions to effective innovation policy and approaches based on new industrial policy are not an exception. Still, ‘success stories’ in industrial policies abound and SPECA economies will willy-nilly have to embark on this learning process. Finally, some success stories in SPECA subregion and failures suggest that countries are already engaged in industrial policy. The issue is whether they can improve and build on past experiences.

6. Key ingredients of the policy mix targeting technological transformation in the SPECA region

At present, the goal of technological and industrial transformation can be regarded a moving target both due to the growing speed of technological change in general and due to the fact that technological change requires a constantly changing policy paradigm meaning that policies that might have worked in the past do not necessarily work today. Such as setup implies formidable challenges – but also great opportunities – for low- and middle-income economies as the SPECA countries that face the need to catch up to the technological frontier.

⁸ Maria Rabadjieva and Judith Terstriep, “Ambition Meets Reality: Mission-Oriented Innovation Policy as a Driver for Participative Governance”, *Sustainability* 2021, 13, 231. (<https://doi.org/10.3390/su13010231>).

Matching policies to existing challenges

As already noted, in terms of their economic structure, the technological position of the local firms in the SPECA region is that of latecomers, which requires a broad approach to innovation through a technology upgrading perspective rather than focused only on R&D based growth. Furthermore, the weak integration into global value chains calls for the need to use targeted policies and FDI and as levers of domestic technology upgrading. At the same time, the SPECA countries on average still have weak institutional implementation capacity and need to develop new approaches to innovation promotion that go beyond top-down approaches.

The negative effect of these structural and institutional factors is amplified by the existence of numerous context-specific problems, obstacles and bottlenecks that hinder innovative development, as evidenced by the perception of local innovation stakeholders (Table 5).

Table 5. Expert opinion about the main problems, obstacles and bottlenecks that hinder innovative development that are common for the SPECA countries

No.	Main problems, obstacles and bottlenecks that hinder innovative development	Countries that indicated it as a top problem	
		No.	Countries
1	Low STI capability in the country	7	Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
2	Corruption and administrative hurdles	4	Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan
3	Poor access to finance for startups	4	Afghanistan, Azerbaijan, Tajikistan, Turkmenistan
4	Low level of government support	4	Afghanistan, Azerbaijan, Tajikistan, Uzbekistan
5	Generally low level of skills in the country	4	Afghanistan, Tajikistan, Turkmenistan, Uzbekistan
6	Low competence of government officials	3	Kazakhstan, Kyrgyzstan, Tajikistan
7	Poor policy coordination	3	Azerbaijan, Kazakhstan, Uzbekistan
8	Unsatisfactory framework conditions	3	Azerbaijan, Tajikistan, Uzbekistan
9	Poor industry-science collaboration	2	Kazakhstan, Kyrgyzstan
10	Poor business competence	2	Azerbaijan, Turkmenistan
11	Weaknesses in the education system	2	Kyrgyzstan, Tajikistan
12	Small domestic market	2	Afghanistan, Kyrgyzstan

Note: Contains problems that were identified by more than one SPECA countries

Source: Dobrinsky (2020).

Under the prevailing in the SPECA region conditions of limited institutional implementation capacities and institutional capabilities, a possible solution can be found in the “best matches” approach, i.e. policy solutions that correspond to limited administrative capacities (Radosevic, 2021). The challenge lays in designing low-cost policy measures and establishing communication with local entrepreneurs, while ensuring both incentives for technology upgrading and performance requirements. This approach requires enhanced industrial and innovation governance as outlined in the previous section, and thus the governance dimension of industrial policy is as important as its direction.

In view of the wide range of possible alternative policy mixes targeting technological transformation in the SPECA countries, it would be necessary, apart from recognizing the weaknesses of economic structure and those of the local context, to make certain assumptions regarding the possible objectives and scope of such transformative policies. These could serve as the foundation for the formulation of some more focused guiding principles of policy design and implementation.

In the first place, one could assume that the objectives of the new industrial policy targeting technological transformation in the SPECA subregion could be defined as twofold: i) in terms of specific technology priority areas and its supporting instruments, and ii) in terms of capacity for self-organisation in private and public sectors in achieving the set policy goals. In such a setting, one recognizes that the state does not have significant resources, or often possesses minimal resources for publicly funded programs earmarked for industrial and innovation policy. Moreover, one recognizes that even when funds are available from external sources, the state does not have the administrative capacity to implement, manage, monitor and evaluate these programs effectively. However, the state is still an indispensable actor, though not the sole coordinator of collective action or activities of actors who aim to solve their problems through coordinated action.

This “networking” or “intermediary” role of the government requires knowledge and intimate understanding of the different sectors so that to organise processes aiming at finding solutions to commonly agreed challenges among stakeholders. As already discussed, new industrial policy is about identifying and facilitating activities of “network organisers” or organisations with the potential to mobilise many actors. One example of this policy would be voluntary quality or performance standards which enterprises agree are desirable future states and are willing to work individually and collectively to achieve them as they will all benefit from it. Another one is the joint co-funding programs on meeting export certificates.

Furthermore, it is acknowledged that the state's role will depend on its capabilities and capabilities for self-organisation or collective action in the private and public sectors. This will determine whether the state will operate only as a regulator, as a substitute for private activities or

as a moderator of the process. However, given low policy capabilities of the SPECA countries, it may be useful to submit any potential policy proposal to some guiding principles of new industrial policy of relevance to the SPECA sub-region (see below).

Tuning policies to existing opportunities

On the other hand, as argued throughout this paper, the environment in emerging economies such as that in the SPECA economies also presents opportunities for catch-up and productivity growth on the basis of knowledge and technology transfer (Dobrinisky, 2017 and 2019). Learning and diffusion of knowledge can support and facilitate the proliferation of this type of innovation processes in low- and middle-income countries. There is also an untapped potential in promoting and developing grassroots innovation in such countries which can offer win-win solutions, on the one hand, for development and economic growth and, on the other hand, for addressing local needs and problems. There is considerable room for managerial and organisational innovations which are not resource demanding. Experience of other countries provides evidence of entrepreneurs applying innovative pricing and financing strategies and business process innovations to serve lower-income markets profitably.

Diversification efforts will be more successful if they rely on local initiatives. International experience shows that bottom-up initiatives generated by the locals – who know best the local environment and context as well as the existing needs, the potential market niches and production opportunities – are the most successful. This is also one of the most effective and efficient ways to raise the inclusiveness of the growth and development initiatives. Therefore, countries need to establish a conducive environment for communities to identify and prioritize their own needs and come up with their own initiatives to address these needs. Support should also be provided to the engagement of key local stakeholders in implementing these initiatives.

Moreover, innovation policies aimed at enabling “bottom-up” initiatives can also create synergies that support inclusive and sustainable growth. Specifically, promoting grassroots social and business innovative ventures can mobilise the creative capacity of disadvantaged segments of the populations and ignite virtuous growth promoting cycles. Bottom-up initiatives based on new technologies can also be a factor in strengthening inclusiveness in policy making and implementation, by enabling new forms of collaborative and participatory governance.

Furthermore, many SPECA countries enjoy high shares of youth population which can be regarded as a development opportunity. Undoubtedly it generates strain in the labour market, the education system and other social systems. At the same time a large core of youth population is a potential source of innovation technology-based growth in the future. For this to happen, however, young people need to acquire adequate knowledge and skills that would facilitate their entry to

the labour market and would allow them to avail of available employment and entrepreneurial opportunities. In turn, for this to materialize, the education systems in the SPECA countries need to ensure equal education opportunities to all citizens and, related to that, to facilitate the school-to-work transition for school graduates.

The most vibrant source of growth in any economy is the small business sector. For entrepreneurship to become an engine of diversification in the SPECA subregion, these countries need to establish a supporting environment for entrepreneurs to set up new businesses and for the development of SMEs. These efforts may include a broad range of steps such as the support to education and vocational training for acquiring entrepreneurial and managerial skills as well as the development of support institutions and instruments for start-ups and SMEs, including the provision of coaching and business services.

One of the biggest lacunae in this area – as well as a deterrent to the expansion of new firms – is the access to finance for innovative entrepreneurs, startups and SMEs. Access to finance is a prerequisite for investment and upscaling of innovative ventures and ultimately for the future growth of innovative companies.

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 including the SPECA economies. Policy interventions can 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 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.

There are a number of new developments in the financial sphere that also open new avenues in the funding of business ventures. 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 undertakings. Moreover, these new online financing mechanisms widen the range of financial services accessible to excluded and underserved market segments including women entrepreneurs and young entrepreneurs.

One possible fast-track approach aimed specifically at the small business sector could be the establishment of public institutions that support the access of entrepreneurs and SMEs to finance needed for the expansion of their business. In turn, the operation of such institutions needs to be closely coordinated with that of the business support institutions targeting SMEs. Another specific avenue for facilitating the access of entrepreneurs and SMEs to finance could be the design and implementation of mass-scale entrepreneurship support schemes based on the low range of micro-credit. Micro-finance at preferential terms would also be well-suited to support entrepreneurs in agriculture but also to support young entrepreneurs. Young people could be specific targets of such micro-finance-based entrepreneurship support schemes and one of the instruments to enhance their entrepreneurial spirit. In addition to finance, such support schemes should provide a range of information and consultancy services to would-be entrepreneurs, including awareness raising, management training, business support services, support to networking and the like.

The digital age unlocks new, open-ended opportunities for innovative entrepreneurship. What is important to point out is that for emerging countries such as the SPECA countries that lag behind the technological frontier, availing of the opportunities of the digital age opens up the opportunity for technological leapfrogging based on ICT in the sense that they can focus on the newest generation of technology, by-passing maturing generations of technology that are in their declining phase in developed economies.

There are, however, a number of prerequisites for this to happen as the opportunities opened up by the digital age require new technological and innovation capabilities, including:⁹

- Extensive internet connectivity and access to digital networks (without political, monetary or bureaucratic restrictions)
- Open access to existing scientific and technological information
- Flexible intellectual property rules that do not discourage users from contributing to projects, and that allow fair use of their contributions
- Physical spaces for innovation (such as fab labs, infrastructure for open collaboration, open collaboration platform) that enable the use of online tools with hands-on learning and open repositories of scientific and technological knowledge.

Importantly, accelerating digital innovation will hardly be possible in the absence of vibrant digital ecosystems allowing the participating parties to collaborate efficiently by easily exchanging ideas and knowledge (thus generating pools of creative talent that could not exist otherwise), information on demanded services, experimentation and working together towards meeting such demand.

In the case of the SPECA countries, the scaling of internet-enabled entrepreneurship and small-business trade can play a critical role. The policy mix should thus address not only the establishment of an enabling environment for the market entry of such entrepreneurs and the building up of digital ecosystems but should also support the growth phases of innovative startups until they are firmly settled on the market.

Guiding principles of new industrial policy targeting technological transformation

Against this background, one could put forward the following main guiding principles of policy design and implementation of a possible policy mix based on new industrial policy approaches that targets technological transformation in the SPECA countries:

- 1) These policies are primarily about upscaling the existing or emerging bottom-up initiatives that can potentially increase sustainable growth and contribute to technology upgrading. The majority of SPECA governments cannot currently lead alone the implementation efforts for industrial upgrading. Thus, other non-profit, industry and donor-supported groups could also join in the responsibility for spearheading these efforts.
- 2) The policies are created and implemented in coordination and co-production with the affected parties; this process is about co-delivery and co-funding.

⁹ UNCTAD, *New Innovation Approaches to Support the Implementation of the Sustainable Development Goals*, New York and Geneva, 2017.

- 3) The policies are about facilitation and moderation of self-organization activities undertaken or proposed by the government and non-state organizations. Hence, the capacity for policy action is not prerogative only of governments but also of ‘commons’, i.e., public bodies, coordination bodies, etc. Policy in this perspective is about facilitation and moderation of self-organisation activities.
- 4) Policy design and implementation is a learning process about what works and what does not. Hence, ‘think small’ or approaches based on pilot projects are its vital characteristic.
- 5) Learning in policy design and implementation requires experimentation, and thus pilot projects are its essential mechanism. Small-scale pilots that focus on improving policy aspects are likely to yield significant benefits. Small pilots can be developed to specific regional and industrial contexts and can be adapted for other contexts, including at the scale of the sub-region. Successful pilots can be reconfigured to scale up, while unsuccessful pilots can be cancelled.
- 6) Decisions about specific policy instruments are more successful when based on a careful assessment of institutional capacities for their design, implementation, monitoring and evaluation. Thus, selectivity is vital; only those actions with a good match between policy intention and policy implementation capacity should be promoted.
- 7) Based on the principle of the ‘best matches’ (not only ‘best practices’) new industrial policy will promote only those actions where there is a good match between policy intention and policy implementation capacity. The government’s role in contributing to and facilitating collective action around different innovation issues remains essential. However, its involvement in the implementation of various policies should match its policy implementation capacities.
- 8) Transparency and competitive nature of public policy programmes and benefits are intrinsic to the developed policy capacity. Despite varying degrees of the policy capacity across SPECA economies, on average this capacity does not seem to be at the required level for effective industrial policy implementation.
- 9) Whatever the level of policy capacity, it is indispensable to rely on the competitive allocation of state enterprise support, including directed credits, and to ensure high transparency and accountability in the allocation of state support, while providing for the system of controls and penalties for rent-seeking and asset stripping.
- 10) The accountability requirements may be an obstacle to the experimentation, essential to new industrial policy. This further urges the use of pilot projects as a key tool, as pilots accept risks and failures with technical risks being clearly differentiated from strategic risks, and the use of ‘diagnostic monitoring’ or early warning system is widespread to protect against the unlikely results.

Based on the principles of new industrial policy relevant to SPECA economies outlined above, one could highlight potential six possible strategic orientations of the new industrial policy for technology upgrading which are focused on improving firms' innovation capacity and on the coupling of foreign sources of knowledge and technology with domestic technology upgrading activities:

- 1) Increase R&D, engineering, and innovation capacity in both the private and public sector;
- 2) Build a strategic policy to embed local supply chains into FDI and international supply chains;
- 3) Prioritize structural reforms in sectors which are priorities for strategic FDI policy;
- 4) Establish actions on building basic technology upgrading infrastructure services linked to export agenda;
- 5) Exploit the potential of the innovation-enhancing public procurement;
- 6) Carry out inclusive and pro-poor innovation programs.

Respectively, in line with such an understanding, one could point out to four broad priority areas for economic diversification of the SPECA countries based on new industrial policy approaches:

- 1) Resource-based industries (oil, gas, gold and other metallic and non-metallic as well as agriculture) are lead areas-candidates for technology upgrading and diversification.
- 2) Labour-intensive industries and development of supply chain programs that can serve as a bridge to export and GVC.
- 3) ICT intensive services (including clustering and collective promotion) due to the low barriers to entry and the essential role of ICT services in domestic technology upgrading.
- 4) Enlarging existing pockets of excellence in engineering intensive and other activities.

These four areas reflect the inherited structure of SPECA economies and areas with distinctly different techno-economic requirements and conditions for technology upgrading. These four areas also represent opportunities for intra-sectoral (value-added driven) diversification; inter-sectoral (related diversification) upgrading and broad (unrelated) diversification.

The ultimate success of industrial policy for a specific area will depend not only on the choice of the right area but also on the complex interaction between area's potential, stakeholders' actions, portfolio of supporting instruments and implementation capacity of government and non-government actors. Therefore, any prioritisation must be accompanied by a policy mix in support of the respective priority area. The range of potential policy instruments is quite broad, from mandatory technology transfer requirements incorporated into the FDI regulations, to preferential treatment of FDI going into priority industries, local content requirements related to priority areas, joint ventures of local enterprises with foreign investors and funding of strategic industrial projects

by proceeds from extractive industries in a sovereign fund, among others. These should be complemented by horizontal policies related to R&D, education, transport, energy and ICT infrastructure.

7. Concluding remarks

The efforts to advance innovation are an intrinsic part of the sustainable development in the SPECA countries and would contribute to the technological transformation and diversification of their economies. The local context in most SPECA countries presents a considerable number of challenges to local policymakers because of the current relatively low developmental levels, historic legacies and the nations' geographic location. At the same time the local environment in the region offers an immense sea of opportunities for innovative entrepreneurship. The generally narrow sectoral focus of the SPECA economies represents a developmental challenge but at the same time opens the door to pursuing a broad range of innovative opportunities that promote on the one hand, economic diversification and modernisation and, on the other hand, sustainable development in the region.

Each nation's limited domestic market makes the case for pursuing export-led development strategies combined with incentives for inward FDI and advancing innovation that can help these countries to diversify into higher-value-added activities and services exports and integrate into global value chains. Given the local conditions, most innovative entrepreneurial ventures seeking to broaden the countries' specialization, be that export-oriented or of an import substitution type, will in all likelihood be ventures driving the innovation processes needed for sustainable development.

Developing and expanding the innovation potential of the SPECA countries requires broad policy reforms. Furthermore, the presence of a range of common challenges and problems that these countries are facing opens many opportunities for fruitful international cooperation in addressing these challenges. By making a cooperative regional effort, the SPECA countries can generate synergies and significantly increase the effectiveness and efficiency of their policy efforts in promoting innovation and technological upgrading.

Within that context, new industrial policy is an emerging set of policy thinking and practices that have some common features and are distinctively different compared to traditional industrial policies. New industrial policies are:

- pro-active and focused on innovation and technology upgrading in an inter-sectoral context;
- recognize that the ultimate limits to growth and the relevant solutions are not known ex-ante;

- market-friendly because they show respect for comparative advantages and export transformation;
- guided by the perceptions of not only market failure, but also system failure;
- centred around the private sector and innovation ecosystem actors to enhance their collective action;
- assume either explicitly or implicitly some elements of experimentalist governance.

A conversion of new industrial policy features into the SPECA context generates several implementation principles which should be considered when designing and implementing industrial policy measures:

- In the SPECA context, the policy is primarily about upscaling the existing or emerging bottom-up initiatives that can potentially promote sustainable growth and technology upgrading.
- The policy should be created and implemented in coordination and co-production with affected parties. Policy in this perspective is about facilitation and moderation of self-organisation activities.
- Learning in policy requires experimentation, and thus pilot projects are its essential mechanism. Successful pilots can be reconfigured to scale up, while unsuccessful pilots can be cancelled.
- The government's role in contributing to and facilitating collective action on innovation remains essential. However, its involvement in the implementation of various policies should match its policy implementation capacities.
- The policy capacity across SPECA economies varies but on average does not seem to be at the required level for effective industrial policy implementation. This further urges the use of pilot projects where risks and failures are accepted and where technical risks are clearly differentiated from strategic risks and use of "diagnostic monitoring" or early warning system when results do not seem likely.

A new industrial policy should be used in conjunction with sector-specific structural reforms and individual infrastructure or modernization projects. Their coordinated implementation will ensure more potent transformative effects. The new industrial policy requires the state to operate effectively as regulatory, developmental and developmental network state. In each of these roles, states aim to resolve different types of failure (market, coordination, system) or enhance collective action by bridging gaps, facilitating self-organisation, and networking with foreign strategic investors.

However, multiple roles and demanding policy capacities for new industrial policy may surpass state capacities. Hence, there is a need to upgrade significantly the policy governance

capacities, mechanisms and processes. It is critical to assess whether in deciding on specific policy measures, governments have assessed their institutional capacities for the implementation and whether they have assessed their technical – operational and political capacities. The absence or presence of coordination capabilities within public or private sectors will determine the appropriateness of specific policy types. Horizontal policies will be more appropriate as compared to vertical when public-private coordination is weak. Also, single agency-based approaches will be preferred when intra-public sector coordination is undeveloped.

Obviously, tackling the full range of needed policy reforms and joint cooperative actions aimed at the technological transformation and economic diversification of the SPECA countries goes well beyond the scope and objectives of this document. Therefore our focus here is mainly be on possible joint collaborative activities that could be undertaken and pursued within the context of the UN SPECA programme.

The SPECA countries have already taken the first steps towards joint efforts in promoting innovation for sustainable development. As a result of a series of intergovernmental consultations the SPECA Governing Council approved in 2019 the SPECA Innovation Strategy for Sustainable Development and encouraged the SPECA countries, donors and partner organizations to support its implementation. The main objectives of the draft SPECA Innovation Strategy for Sustainable Development are:

- Upgrade the knowledge and skills base of key stakeholders in the SPECA countries to match the challenges of addressing SDGs with innovative solutions;
- Facilitate the diffusion of innovations and the transfer of technologies addressing sustainable development challenges in the subregion;
- Enhance the institutional framework for subregional cooperation for implementing innovation addressing sustainable development challenges of common interest;
- Contribute to improved performance of the SPECA countries in the degree of SDG achievement.

To achieve these objectives the SPECA countries will be applying the following key cooperation mechanisms:

- Strengthening the subregional policy dialogue and the sharing of good policies and practices, including the attraction of leading international expertise in innovation for sustainable development;
- Working together in identifying subregional and transboundary sustainable development challenges of high priority and common interest that call for innovative solutions;
- Raising awareness in the SPECA countries on the role of innovation in the efforts to achieve the SDGs.

- Strengthening cooperation with existing platforms and mechanisms for international collaboration in promoting innovation for sustainable development within the United Nations family of organizations.

The goals outlined in this strategy are ambitious but challenging. This is because it is widely acknowledged that the national innovation systems of the SPECA countries are still underdeveloped and their STI and governance capabilities are limited. Despite the declared ambitions of the SPECA countries, many of the policies, instruments, institutions, and processes that have been put in place to facilitate innovation are often ineffective and do not always bring about the expected results. Therefore, these countries still face momentous challenges in matching outcomes with ambitions when it comes to the goals related to technological transformation and innovation.

At present, the UNECE, together with ESCAP, is conducting the UNDA project 2023N “Strengthening innovation policies for SPECA countries in support of the 2030 Agenda for Sustainable Development”. The project aims to support the seven participating SPECA countries in their efforts to spur innovation as a central driver of the increasingly urgent transition from a low productivity and resource-intensive model of economic development to knowledge-based and more sustainable economic growth, in line with the SDGs. The project’s main objective is to strengthen institutional capacities of the SPECA countries to harness innovation as a driver of sustainable development and regional integration.

All these initiatives are aimed at helping and supporting the governments of the SPECA countries to identify cooperative solutions for promoting innovation, technological progress, economic modernisation and diversification. These issues, including the versions of the Action Plan for implementing the SPECA Innovation Strategy for Sustainable Development have already been discussed at a series of intergovernmental meetings of the SPECA countries. There is a considerable intersection of such cooperative efforts with the objectives of the UNDA project 2023N. Therefore, a possible integration of discussions of its implementation activities with the discussions on the finalization of the SPECA Innovation Strategy Action Plan might boost further the synergetic effect of these initiatives.