

### **UNIDO's use of technology and innovation to increase resilience.**

1. Core to the concept of resilience are the dimensions of (i) the embedded and localized nature of innovation and technological change; (ii) macro, meso and micro level life cycle issues; (iii) path dependencies and lock-in, and (iv) the role of 'socioeconomic culture,' or institutional infrastructure (organizational 'routines' of coordination and control)<sup>1</sup>. Additionally, the attributes of rebound, adaptation and recovery are crucial. Hence, "resilience depends not only on endowments (producers, networks, skilled labour and strong institutions) but on capacities to leverage innovation in response to changing technology, markets and resource environments"<sup>2</sup>.
2. The issues of infrastructure and inequality should be considered alongside, particularly in the context of development and agenda 2030 and the sustainable development goals (SDGs).
3. The United Nations Industrial Development Organization (UNIDO) addresses these core tenets through its promotion of inclusive and sustainable industrial development (ISID), particularly with its work in the areas of technology and innovation. A selection is highlighted below.

#### **Boosting Innovation**

4. UNIDO has developed tools for mapping and measuring systems of innovation, intervening at the national, regional and sectorial levels. These tools aim to empirically understand the network dynamics between actors of the system, and the strengths and weaknesses of linkages, culminating in a set of evidence based policy recommendations and capacity building activities that support the innovation process and would ultimately lead to increased productivity, growth and economic resilience.
5. At the meso level, UNIDO interventions include diagnostics of key nodal level institutions. The work focuses on both technological and management capabilities and capacities, which is articulated as a short, medium and long term action plan. The purpose of this approach is to better enable those institutions to react and respond to the needs and changes of the sector, which in turn speaks to resilience.
6. Micro level activities involve support at the level of firms, with a focus on innovation and productivity. This results in a combination of sector level policies and a set of interventions undertaken at the unit level to enhance their capacity and capability to innovate and translate this into strength and resilience.
7. UNIDO is also involved in partnership with ISO in developing the standard ISO50501 on innovation management.

#### **Promoting quality and standards**

8. Quality and compliance of products and services with market requirements and standards are key elements of competitiveness in global business relations. UNIDO's interventions in this respect span from policy and governance advice to the development of quality infrastructure institutions and

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<sup>1</sup> Grabher, 2009

<sup>2</sup> Jennifer Clark, Hsin-I Huang and John P. Walsh, pg.122, 2015

conformity assessment services, including the support of the private sector in achieving compliance with international standards. The specific role of UNIDO has been the development of training material for awareness building and a programme for capacity building with a focus on SMEs from developing countries Emerging Market Economies and Economies in Transition.

### **Mobilizing responsible investment and sustainable technology**

9. Responsible investment and sustainable technology contribute to economic transformation and lead to greater prosperity and resilience. Increased investment and technology flows create new jobs, generate income and help diversify the economy by expanding the production base while improving market access and infrastructure development.
10. UNIDO's interventions in this area are based on monitoring (analysis and assessment of challenges and opportunities created by investment flows), learning (information sharing and knowledge dissemination for project identification, formulation and promotion) and networking (linkages to potential partners throughout the business partnership process).

### **Ensuring industrial safety and security.**

11. Industrial processes and industrial plants may create hazards that can harm people, assets and the environment, affecting the social, economic and environmental pillars of sustainable economic development. Natural hazards, political instability (sabotage), and cybercrime can also cause massive damage to industry and the environment, therefore inhibiting the realization of inclusive and sustainable industrialization. Climate change will further exacerbate the economic damage stemming from natural disasters and will raise the risk of hazards. If governments and companies alike continue to ignore industrial safety and security, they will face lower productivity, competitiveness, and resilience.
12. UNIDO through its core functions of policy advice, convening and norms and standard setting; technical cooperation and building partnerships is addressing best practices for ensuring industrial safety and security, such as setting national and international standards and their compliance; use of safety management systems; role of laws and regulations and a system of their enforcement; use of Industry 4.0 technologies and benchmarking; role of health, safety, security and environment policy; provision of education and training; establishing supervisory functions and administrative controls; role of multi-stakeholder dialogue and partnerships and international cooperation for securing industrial controls; and public private partnerships.
13. Emerging trends in technology, such as big data, cloud computing, artificial intelligence (AI), robotics, and 3D printing are changing the face of manufacturing. They also create new challenges and opportunities for securing industrial safety and security. Inevitably, new forms of working environments will render current industrial safety and security regulations obsolete. Industry 4.0 offers the opportunity to further increase safety due to the ability to gather data in real time and then act upon it before a potential hazard becomes a real one.
14. Companies have started to integrate Health, Safety, Security and Environment policies into their innovation and change management departments. Similarly, government agencies need to adopt innovative approaches to improve their regulatory effectiveness, and invest in building their monitoring capacities.

15. Neglecting industrial safety and security can cause massive damage to industry and related infrastructure and can therefore inhibit the realization of 2030 Sustainable Development Agenda and the associated SDGs (SDG 3; SDG 5; SDG 6; SDG 7; SDG 8; SDG 9; SDG 12, SDG 13 and SDG 15).

### **Energy**

16. The global energy system is changing. The ways in which energy is produced, transmitted, and in which people access energy are all transforming, while electricity is and will remain one of the few commodities in the modern world that must be produced, distributed and delivered in real time to meet demand. In this transitioning energy environment innovation is crucial to addressing future pressures whilst tackling the environmental problems associated with climate change.
17. UNIDO's clean energy programme aims at enhancing the use of renewable energy and the efficient use of energy by industry. Additionally, UNIDO facilitates access to affordable and sustainable energy for productive activities and income and employment generation. Key dimensions under this priority are the demonstration and transfer of low-carbon energy technologies and the development of policies, regulations and standards, as well as of management practices. UNIDO's work supports governments to capitalize on the opportunity to stimulate market development and to meet previous unmet society needs by transforming our energy system into a more sustainable, adaptable and resilient structure. To this end UNIDO approaches the energy sector in a holistic manner considering climate technology and innovation, energy systems and infrastructure, as well as climate policy and partnerships.

### **Environment**

18. Environmental degradation, in particular related to climate change and pollution, remains another major global issue, requiring a green economic transformation. UNIDO's work actively supports industries to build partnerships along value chains to introduce: i) resource efficiency best practices, eco innovation and environmentally sound technologies; ii) supply/sourcing of sustainable raw materials for circular production; iii) - enhance product design for recyclability to extend life time; iv) reverse logistic systems for post-consumer waste. UNIDO's work in these areas is exemplified by demonstration projects that set-up eco-innovative zero water discharge smart labs, and incorporated business networking, scouting and matchmaking for supply chain green market opportunities, and reverse logistics for upcycling and recycling of waste

### **Challenges, opportunities and recommendations**

19. Challenges to strengthening resilience include the lack of fiscal and monetary resources, as this directly impacts the ability to directly invest in requisite change. In addition, lack of capacity both in terms of human capital and the institutional level, impacts the ability to absorb and develop the requisite knowledge and skills impeding the ability to successfully react and adapt to externalities and shocks. At a more broad-based level, with the advent of the Industry 4.0, challenges include, misaligned industrial policies and lack of hard and soft infrastructure, support institutions, appropriately skilled labour and sufficient flow of innovation, as well as, at the micro-level, own preparedness of enterprises. Additionally, implementation of Industry 4.0 in advanced economies raises further challenges for developing countries and countries in transition, such as how it impacts competitiveness and job

creation, potential reversal of foreign direct investment flows, and a further manifestation of an already widening technology gap.

20. Conversely, opportunities include positive implications of implementation of Industry 4.0, such as improvements in productivity and competitiveness, increased resource efficiency and effectiveness, and hence enhanced ability to protect the environment, and product diversification/customization. Taken together, these contribute to more sustainable production and consumption patterns and a more resilient economy.
21. Since the economy and environment are strongly interlinked and interdependent there is the need for a holistic systems-based approach to enhancing resilience. This is underscored by UNIDO's approach of ISID. It is crucial that any engagement is informed and evidence-based, with measurement and data at its core. Only then can the requisite policy for fostering resilience be built with a longitudinal perspective. Within this framework there is the possibility for resilience to be developed on the principles of fairness and inclusiveness.