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**Overarching Context**

The ongoing Covid-19 pandemic has been the most disruptive in a century, putting an immense strain on societies and economies around the globe. In the face of such an outbreak, the immediate priority for policymakers worldwide is to upscale capacities in the medical sector rapidly in order to effectively manage the sudden surge in critical patients. In addition to the immediate strains placed on national health services at this time, the Covid-19 pandemic has impacted significantly upon the livelihoods of millions of people and the macro-economies of the world. Middle Income Countries and Least Developed Countries are especially affected in terms of being able to implement their national industrialization strategies, further weakening an already fragile macroeconomic situation for many. The containment measures enacted to avoid further contagion have resulted in decreased manufacturing production, trade volumes and investment flows.

The Covid-19 pandemic may have considerable negative implications for the implementation of the 2030 Agenda for Sustainable Development. Given the immediate threat posed to public health by the pandemic, priorities and funding at the national level earmarked for international development may be diverted to address immediate humanitarian concerns. This understandable prioritization of competing demands may cause shortfalls in other policy areas, potentially leading to unforeseen consequences for people, planet and prosperity further down the line.

However, it is also evident that the Covid-19 pandemic affords the international community an opportunity to accelerate progress towards collaborative solutions to these international development issues, most notably with through advanced manufacturing technologies and digitalization.

Even prior to the crisis, global manufacturing was in the midst of an unprecedented and rapid change, due to the convergence of the digital and traditional manufacturing sectors: the Fourth Industrial Revolution (4IR). Disruptive technologies, such as artificial intelligence, advanced robotics, 3D printing, wearable and the Internet of Things inter alia are revolutionizing the manufacturing landscape, presenting huge opportunities to upscale productivity but simultaneously challenging social inclusion objectives.

The accelerated pace of change of 4IR is unique in comparison to previous Industrial Revolutions, which took decades or even centuries to come fully into effect, and it will touch aspects of life far beyond the workshop or factory, impacting upon the way we live, interact and travel. The far-reaching repercussions of the current pandemic have forced the world to consider the urgency of structural shift towards the 4IR, with Covid-19 becoming the unexpected accelerator of the digital transformation.

The disruptions caused by the crisis are having a profound impact on the world´s mindset, which is now more open to embrace change to curtail the effects of the pandemic and to return to normality. In fact, due to these disruptions the world has arguably experienced greater digital transformation in a few months than we have seen in the last decade.

The crisis exhibits a unique opportunity to leverage the 4IR to future-proof productive sectors, foster long-term resilience and build a better future. In some ways, we can already observe that the outbreak and associated lockdowns and quarantining measures implemented in most countries have spurred on the mainstreaming of 4IR. For instance, migration to cyberspace and remote participation in social, educational and economic activities is allowing us to reduce the psychosocial impact of social distancing. Big data is increasingly being deployed in terms of crisis management and predictive learning, allowing real-time data-based decision making and a faster and more efficient response. Similarly, the world has witnessed a shift to electronic commerce over physical retail and service provision.

The necessity for crisis response has also undoubtedly spurred on innovation in some contexts. Artificial intelligence and Big Data have been used to assist virus research, vaccines development and data analysis for supporting public policy decisions. Similarly, robotics has played an increasing role in monitoring and assisting patients, while wearables demonstrated to be effective in screening and tracing patients and medical staff. The 4IR has brought about a wide range of potential solutions to fight against the COVID-19 and its associated social, economic and environmental effects.

It is thus evident that the “new normal” in the post-pandemic world will increasingly be driven by 4IR technologies and their applications for inclusive and sustainable industrial development (ISID).

**UNIDO’s Role in Facilitating the Digital Transformation**

In view of the drastically changed landscape for international development, UNIDO has been refocusing and repurposing its functions, in order to better contribute to common crisis response actions and also to help developing countries to build back better. The core functions that UNIDO will undertake to support Member States transition to the Fourth Industrial Revolution are as follows:

1. Through its **analytical work**, UNIDO provides and disseminates evidence-based support for ensuring a smooth structural transformation to 4IR. Recent examples of this include inter alia the Industrial Analytics Platform, which has been providing cutting-edge analysis of the implications of Covid-19 for the future of manufacturing; and the DTI Knowledge Hub, which disseminates knowledge on how quality infrastructure and industry can respond to the outbreak.
2. **Technical cooperation programmes** and strategies are also being adjusted to future-proofing industry against exogenous shocks and to achieve ISID in a rapidly evolving environment. UNIDO has identified and developed integrated service packages to Member States such as the COVID-19 Industrial Recovery Programme, which will provide targeted support to national governments with the restructuring of their industrial sector in the aftermath of the crisis.
3. UNIDO is also tailoring its **normative function** and quality infrastructure programmes to meet the demands of pandemic and post-crisis rehabilitation, including standards, metrology, conformity assessment, accreditation and certification, to make sure that industry can continue to meet essential societal needs.
4. **Convening** is a crucial element of international cooperation, in order to gain the widest possible range of expertise, exchange and agreement on industrial development actions. Partnerships are equally critical to maintain manufacturing operations as much as possible worldwide. UNIDO thus coordinates closely with partners in the private sector, government and academia to this end.

UNIDO has also established a Department of Digitalization, Technology and Innovation (DTI) to respond to the growing demand for supporting inclusive and sustainable industrial development (ISID) in the era of the new industrial revolution, the leads the way in addressing opportunities, challenges and risks stemming from the fourth industrial revolution (4IR) and its contribution to sustainable socio-economic progress. The Department is responsible for the strategic coordination of 4IR-related matters with designated focal points in other technical Departments and organizational entities of UNIDO, as appropriate. In consultation with public and private partners, DTI designs and implements holistic interventions that are tailored to specific country needs. Some of the key responsibilities of this new department among others are:

* Assist countries in the diffusion and adaptation of new technologies related to digitalization and adoption of cyber-physical systems, such as artificial intelligence, big data and other new technologies, facilitating a smooth transition to the 4IR;
* Support governments in improving their associated strategies and policies for business
* environment, both at national level or at micro level (industrial and technology parks, innovation hubs, export processing zones, etc.) for private sector development, investment, technology and innovation;
* Strengthen the regional and national capacities of developing countries and countries with economies in transition to develop the required quality infrastructure system for sustainable industry, including standards, metrology, accreditation and conformity assessment, enhanced by the application of innovative and 4IR technologies;
* Promote science, technology and innovation with a view to enhance the productivity and competitiveness of enterprises through the introduction of smart technologies such as additive manufacturing, blockchain, cloud computing and drones;
* Support private and public institutions that promote private sector development and responsible or impact investment, and establish mechanisms for the promotion of sustainable business alliances and the diffusion and adoption of innovative and 4IR technologies;
* Promote enterprise and inter-sectoral clusters and consortia linkages with local institutions and large corporations towards their sustainable integration into national and global value chains, harness private sector cross-fertilization innovation for enterprise development, skills enhancements as well as supplier development.

**Examples of UNIDO’s Digital Technical Co-operation Projects:**

***Contribution to Digital Policy Development:***

In 2019 and 2020 UNIDO was requested by UNDP and the EIF to contribute to the E-commerce and Digitization Chapters of the Diagnostic Trade Integration Study’s for Cambodia and Bhutan respectively. To prepare these chapters, UNIDO leveraged its analytical capacities to conduct research on the status of digitization and e-commerce in these countries. To complement this research, UNIDO also conducted in-person (Cambodia) and remote (Bhutan) interviews with high level representatives from government and private sector to gain better insights on the challenges to be addressed as well as the opportunities present. The information collected and its analysis was presented in the chapters along with a list of actionable recommendations for Cambodia and Bhutan to transition to the digital economy. Both these chapters prepared by UNIDO were endorsed by the Governments and they currently form the foundation that is being used to develop new policies and initiatives to expedite the implementation of the recommendations.

***Intelligent Manufacturing Technologies and Global Innovation Network Projects***

Intelligent Manufacturing Technologies (IMT): UNIDO Project on Intelligent manufacturing technology and its application in small and medium-sized enterprises (SMEs) is an initiative taken towards implementing WSIS outcomes. SMEs are important driving forces of industrial development in virtually all countries, including China, where SMEs provide around 80% of the total employment. While the introduction of ICT could speak to SMEs’ needs of facing intense competition and specific customer expectations, many challenges are in the way for Chinese SMEs to implement it. The overall objective of UNIDO project is to introduce SMEs from China manufacturing sector to the concept of IM and its attendant ICT needs, increase awareness of its benefits, and provide capacity building.

Global Innovation Network (GIN): Under the framework of the Global Innovation Network Project, UNIDO established Shanghai Global Science and Technology Innovation Center (hereinafter referred to as SGSTIC) in 2017, as the implementation institute to strengthen the global innovation network. SGSTIC has developed a comprehensive innovation platform with five branches, including: expert sharing, global cooperation, industry development, financial support and public service, with the purpose of providing services for the innovative research and the development of small and medium-sized enterprises. Enhancing enterprises' independent innovation capabilities, and creating international innovation cooperation and exchange platform are the key objectives of the UNIDO ongoing initiative on Global Innovation Network.

**UNIDO Malacca Smart Cities development – Malaysia**

The project implemented by UNIDO’s Energy Department demonstrates an integrated package of technologies to assist Melaka in carrying out and facilitating investments, which will reduce GHG emissions and enhance the effectiveness, efficiency and safety of their technical and industrial systems and processes as well as transportation modes – with potential scale up to other cities.

Smart grid technologies that are being implemented will enable higher levels of renewables in electricity systems by making the system more flexible, responsive, and intelligent. They will also be used to promote the deployment of Electric Vehicles (EVs) and higher energy efficiency in buildings through a two-way communication using smart meters.

Key barriers to a comprehensive approach of smart grid technology, electrical vehicle usage, renewable energy deployment, and building energy management systems in Malaysia include:

* Non-existence of smart grid policy and regulatory framework;
* Lack of or weak institutional framework for smart grid;
* Limited awareness and technical expertise in integrated smart grid technologies;
* Limited experience with regards to the technical, economic, social and environmental aspects of smart grid;
* Limited experience in incorporating measures and technologies to increase the energy efficiency in new and existing buildings;
* Limited know how in renewable energy integration as an energy source and its applications in buildings.

The approach to remove such barriers within this project will be through demonstrations of the application and impacts of RE integrated smart grid technologies for distributed RE systems, electric vehicle and building sectors. The expected outcome of the demonstrations is an enhanced local capacity and improved confidence in the feasibility, performance, energy, environmental and economic benefits of integrated smart grid system comprising technologies for distributed RE systems, RE-powered EV charging infrastructure, battery as energy storage system as well as Energy Efficiency (EE) and RE applications in buildings.

The project will showcase the technologies of an integrated smart grid system comprising a few key elements which include: smart meter installation, renewable energy application e.g. solar PV for distributed energy generation and solar thermal energy for heating and cooling, EV charging station integrated with battery energy storage system and renewable energy, energy efficiency through BEMS/HEMS applications for smart buildings, time of use (TOU) apps for customer energy management portal and smart grid system linked with power line communication for the information exchange between consumers and utility company.

For further information, please refer to Malacca Sustainability assessment which is one of the outcomes of UNIDO engagement with the city:

<http://documents1.worldbank.org/curated/en/408101556608980667/pdf/Overview-Report-Pathway-to-Urban-Sustainability.pdf>

**Global CleanTech Innovation Programme (GCIP)**

The GCIP promotes an innovation and entrepreneurship ecosystem by identifying and nurturing cleantech innovators and entrepreneurs; by building capacity within national institutions and partner organizations for the sustainable implementation of the cleantech ecosystem and accelerator approach; and by supporting and working with national policy makers to strengthen the supportive policy framework for SMEs and entrepreneurs.

Through this approach (via cleantech ecosystems and accelerators), the GCIP catalyzes investment to support and move start-ups entrepreneurs forward towards the development and commercialization of their innovative ideas.

Partnerships and close consultations with all national stakeholders are seen as critical to maximizing synergies and sharing knowledge and best practices which can help in enhancing the contribution of cleantech start-ups towards climate change mitigation, while increasing productivity and generating growth and wealth.

Starting with the pilot in South Africa in 2011, the GCIP has been implemented in a total of eight countries, including Armenia, India, Malaysia, Morocco, Pakistan, Thailand and Turkey. With the addition of Ukraine in 2018, geographic reach of GCIP is expanded to nine countries and following the success of GCIP thus far, UNIDO plans to expand the geographic scope of GCIP to twenty five countries by 2020 to become a truly global accelerator of cleantech innovations. Between 2014 and 2018, more than 865 start-ups have been mentored, trained and supported across the participating GCIP countries, selected from thousands of applicants. The innovations identified and developed in GCIP partner countries also have the potential to address challenges in other parts of the world. GCIP provides opportunities for locally grown solutions to reap global impacts by providing mentoring and market access across borders.

***Participation in Global Forums***

UNIDO’s efforts to promote digitization in Member States has enabled the organization to participate in several global forums to contribute to global co-ordinated efforts to catalyse ICT integration efforts. Notable examples, among others include participation in the World Summit on Information Society (WSIS); recognition as a eTrade 4 All member; and supporting the UN South-South Galaxy initiative.

The WSIS Forum, co-organized by ITU, UNESCO, UNDP and UNCTAD, in close collaboration with all WSIS Action Line Facilitators/Co-Facilitators, has proven to be an efficient mechanism for coordination of multi- stakeholder implementation activities, information exchange, creation of knowledge, sharing of best practices and continues to provide assistance in developing multi-stakeholder and public/private partnerships to advance development goals. UNIDO in recent years has consistently been invited by the organizers to provide contributes to their reputed annual report. Further, senior management of UNIDO have had the opportunity to participate in the forum panels and forge partnerships to deliver joint solutions to promote ICT adoption across different sectors.

The eTrade for All initiative was launched in 2016 to help developing countries have better access to the capacity building and technical assistance programmes that the international community offer, with the overarching goal of fostering inclusive and sustainable development. The platform offers a unique gateway for those in need of technical assistance to find those who will be able to provide that assistance. UNIDO became a partner in 2017 and since then has regularly participated in the annual E-commerce Week; provide inputs to the E-trade Readiness Assessments; and has initiated other e-commerce projects with other partners.

The United Nations Office for South-South Cooperation along with development partners has developed a global knowledge sharing and partnership-brokering platform – South-South Galaxy. Powered by artificial intelligence, the platform aims to respond systematically and effectively in supporting developing countries’ demand to connect, learn and collaborate with potential partners. It serves as a consolidated South-South solutions platform for Southern partners in the UN system and acts as a one-stop-shop for all partners to use. The platform compliments, rather than substitutes or duplicates existing national or regional institutional arrangements. UNIDO has numerous technical co-operation projects which heavily focus on South-South Co-operation and the organization engages heavily in this platform to spread awareness on the organizations work in this thematic area as well as reach out to new partners to contribute to these initiatives.

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