

# DIGITAL AND GREEN TRANSFORMATION IN DEVELOPING ECONOMIES

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# Digital and Green Transformation in Developing Economies

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## Abstract

Recently, several international development organizations and civil society have focused their efforts to assist developing economies in a green and digital transformation. A green transformation is necessary to address Climate Action (SDG 13). Digital transformation has been identified as key to development and to addresses several SDGs. Sustainability concepts are to be a fundamental part of the digital transformation. It is recognized that it is essential to ensure the new technologies in the digital, biological and physical worlds are adopted to remain human-centered and serve society and the planet as a whole for the prosperity of all. Society can thus promote economic development and solve social problems simultaneously. This paper discusses the elements of a green and digital transformation, initiatives currently underway by international development organizations, civil society and developing economies, and progress to date toward the common goals established in the SDGs.

## Introduction

This paper is based on a presentation made, and subsequent research, by the [author](#) at the United Nations Economic Commission for Europe (UNECE) Thirty-second Session of the Working Party on Regulatory Cooperation and Standardization Policies (WP.6) on 7 -9 November, 2022 in Geneva, Switzerland. The UNECE 70th Commission session (April 2023) established a theme “Digital and green transformations for sustainable development in the ECE region” for its work in 2024-2025.

The World Bank Group (WBG) and the International Monetary Fund have also focused their developmental efforts on a digital and green transformation with major projects. Several sessions on these topics were held at the WBG-IMF Spring Meetings on April 10-16, 2023 in Washington, DC. The United Nations (UNIDO, UNEP), WTO and several non-governmental organizations (NGOs), which are critical change agents in promoting economic growth, human rights and social progress, are involved in the digital and green transformation in developing economies. Information on work by international developmental organizations and NGOs is presented in this paper.

The paper also provides recommendations on the regulatory framework, i.e. policies, regulations and international standards that will promote and utilize green and digital technologies to address the three pillars of sustainability—people, planet and prosperity—in line with the Sustainable Development Goals (SDGs).

## Fundamental Strategy for Development

It is recognized that it is essential to ensure the new technologies in the digital, biological and physical worlds are adopted to remain human-centered and serve society and the planet as a whole for the prosperity of all. It is foreseen that innovation will create new value that bypasses regional, age, gender, and language gaps and provides products and services finely tailored to diverse individual needs, some not yet known. Society can thus promote economic development and solve social problems simultaneously.

The [SDGs](#) provide a framework for development with several high level goals. The main goals addressed in this paper are SDG 13, Climate Action; SDG 9, Industry, Innovation and Infrastructure; and SDG 5, Gender Equality. There are also other SDGs that are targeted in a green and digital transformation as discussed by UNIDO in its report on [Standards and Digital Transformation](#). SDG 17, Partnership for the Goals is also important as development can only be achieved by the combined will of the developed and developing economies. For example the Targets for SDG 17 and SDG 9, “Enhance [...] regional and international cooperation on, and access to science, technology and innovation” Target 17.7 - “Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries [...]” Target 9.5 “Enhance scientific research, upgrade the technological capabilities

of industrial sectors[...] encouraging innovation [...]” Target 9.6 - “Support domestic technology development, research and innovation in developing countries [...] are all important Targets for the development of the technological base in developing economies.

## Digital Technologies and Transformation

### Regulatory Framework

The regulatory framework, i.e. policies, regulations and international standards should be developed that will promote and utilize green and digital technologies to address the three pillars of sustainability—people, planet and prosperity—in line with the Sustainable Development Goals (SDGs). Sustainability concepts are to be a fundamental part of the digital transformation. Therefore, it is important to undertake digital transformation under the same umbrella policies as for green transformation. Climate change will negatively impact the vulnerable in the population the most and digital technologies can compensate for that impact.

The digital technologies recommended by UNIDO for evaluation in a digital transformation in its report on [Standards and Digital Transformation](#) are (1) Artificial Intelligence (AI); (2) Block chain; (3) Internet of Things (IOT); (4) Robotics; (5) 3D Printing; and (6) Unmanned Aircraft. UNIDO identified the essential principles needed to guide standards developed for digital transformation governance - the essential criteria to consider when developing standards for digital transformation worldwide for prosperity and the planet - *trustworthiness, inclusiveness, sustainability, interoperability, safety and security, data privacy, and international collaboration*. Some of the recommendations from UNIDO were to:

- Adopt a regulatory framework to discourage and prevent monopolies to dominate sectors of society with little accountability or transparency to prevent infringement on privacy and personal rights and freedoms;
- Promote digitalization process to overcome the spatial and social barriers as digital technologies enables new inclusive and sustainable production methods and business models;
- Prevent former modes of governance, which are largely reactive in nature, and adopt governance rules and regulatory approaches for new technology and processes to be more agile, flexible and resilient;
- Develop timely and harmonized international standards that can play a pivotal role in shaping the digital transformation process.

The OECD [Recommendation of the Council on Regulatory Policy and Governance](#) is the fruit of careful assessments of best practice identified by the Regulatory Policy Committee through a decade of reviews of OECD countries. The [G20 Digital Economy Task Force](#) has been piloting an initiative on agile regulation for several countries, serving as a useful tool to share experiences and common approaches to more agile governance and regulatory models for innovation. The World Bank has also documented shared experiences in its report on [Global Experiences from Regulatory Sandboxes](#). There is a considerable amount of material that could be evaluated for determining the most approach(s) for a specific economy.

A critical component of the regulatory framework are the standards on the technologies that can be voluntarily used for compliance with performance-based regulations. International standard setting activities remains fragmentally concentrated at the national level, leaving room for international exploitation and harmonization. The use of international standards such as from the International Standards Organization (ISO) is necessary as these standards reflect a broad international consensus on the topics addressed in the technical standards.

In the past, developed nations (the Global North) provided the main initiatives behind the development of international standards. Although developing countries (the Global South) are members of international standards organizations such as the International Organization for Standardization (ISO), they have not played a central role in the standards development process in the past. Presently, international standards organizations have initiated efforts to enhance the participation of representatives from nations of all economies. The importance for experts from developing economies to participate in technical committees of international standards organizations is important and stressed, especially for the implementation of the digital and green transformations.

### [The Digital Public Infrastructure \(DPI\)](#)

The establishment of a national Digital Public Infrastructure (DPI) is critical to a digital transformation, especially to address the needs of the under privileged, including women. The Digital Public Infrastructure should be built to ensure it is inclusive of the entire population.

Development of a DPI is presently encouraged and funded by international development organizations such as the World Bank and IMF. Several sessions on the topic were held at the WBG-IMF 2023 Spring Meetings in Washington DC. Some examples of success stories were presented, particularly the initiative in India done in collaboration of the government and the private sector. A presentation made by the Chairman of Infosys, Nandani Nilekandi, was lauded by the IMF Managing Director, Kristalina Georgieva as an example that can be used by IMF in other projects. IMF has published a working paper, [Stacking up the Benefits: Lessons from India's digital journey](#) on that work. Other examples of success stories from Southeast Asia (Singapore, Philippines) and Estonia were also presented and discussed.

The following are the good practices determined by these developing economies that have successfully implemented a Digital Public Infrastructure. Access to the internet to provide employment opportunities, and the ability to conduct financial transactions for a wide range of the population is critical to national development. The DPI should address the needs of rural areas so those populations are able to conduct financial transactions through the internet. The ability to conduct e-commerce and other financial transactions for micro and small enterprises should be an essential element of the digital transformation. For example, India has developed systems for e-commerce such as Fastag, GST, Waybill, Digital locker, and Account aggregator (for lending) for a wide range of financial transactions which are in use at the present. A small merchant selling vegetables is able to receive immediate payment electronically without incurring any transaction fees. The systems were developed through public and private partnerships.

Other benefits of a Digital Public Infrastructure are increase in tax revenue, targeted welfare, financial transparency, reduced risk, availability of credit, and a single market for services and goods. Artificial intelligence can be used for translations into numerous languages which is essential for a country like India.

Government leadership is essential. Governments should develop the national Digital Public Infrastructure with the private sector and other stakeholders. Estonia involved NGOs, the private sector, academia, government, technicians and users in the development of their national DPI. This encourages innovation from the private sector and provides a balance of government and private sector investments. Any government subsidies for the DPI is for the public good. The DPI should be open source and supported by non-profit companies to operate platforms and for governance. A common platform, as well as interoperability between countries, for the various elements of a DPI can be beneficial and is recommended. Establishing common platforms also allows better means to establish cyber security and prevent cyber-attacks. The UN is establishing a [Global Digital Compact](#) to facilitate sharing of information and to further facilitate the digital transformation.

The benefits of implementing a DPI is significant. A World Bank study concluded that a 10 % increase in broadband leads to a 1.5 % increase in GDP. This is significant. Also, digital tools are needed to implement free trade agreements, e.g. the Africa Free Trade Agreement, that benefit the economies.

However, presently half of humanity has no access to the internet. This has led organizations such as the World Bank and civil society to initiate a roadmap for digital equity. Digital equity is needed to end poverty. The investment policy must address “human rights.” The infrastructure for a DPI is needed but also affordability of the services, development of the skills needed, and focus of the content to benefit the population. The whole package should be funded, not just the technology. Policy setting is more important than establishing the technology itself, and should address the needs for development. Understanding the needs of the local populations is necessary to ensure usage of the services and benefits from the DPI. The needs of micro and small enterprises should be addressed as well as providing the opportunity for women to work at home. If financing of a national DPI is not possible at the beginning, medium sized projects by the private sector can also be beneficial.

It is important to establish goals for social benefits. Indicators to judge benefits should include factors such as skill levels achieved, access to the internet, and reaching the goals for development.

### Green Transformation

Climate change poses a major threat to long-term development objectives, especially poverty reduction, and accelerated emission reductions are needed, particularly in high-income and other high-emitting countries. It is noted that reducing emissions can be done without compromising development. Low-carbon development strategies can reduce emissions by 70%, without significant impact on growth, provided that policies are well designed and financing is available. In lower-income countries, financing needs can exceed 5 percent of GDP, which will require more support from high-income countries, including increased concessional resources.

Although the challenges for a green transformation are significant, many international development organizations, including the World Bank Group, are establishing this as a priority based on the international consensus for Climate Action (SDG 13). It is essential that a green transformation address both climate action and development at the same time. To support the alignment of development and climate objectives at the country level, the World Bank Group, along with its private sector arm (IFC) and IMF, has launched a [core diagnostic tool](#): the Country Climate and Development Report. The plan integrates climate change and development considerations and aims to assist governments, private sector investors, citizens, and development partners prioritize the most impactful actions that can boost resilience and adaptation and contribute to global public goods by reducing greenhouse gas (GHG) emissions, while delivering on broader development objectives. Twenty four countries have implemented this plan for their economies.

The establishment of the overall policy and regulatory framework, and the communication of the policy with the general population, is essential for success. A human-centered approach is needed to establish policies and the regulatory framework. A policy for green transformation should include the establishment of opportunities for employment taking advantage of the digital public infrastructure discussed above. Mitigation measures will need to address displacement issues such as for coal-to-green transition. Some examples of success in developing plans for a green transformation are those of Turkiye and Kazakhstan. The IMF has also initiated funding mechanisms (e.g. the Sustainability Trust) for a green transformation and collaborates with the World Bank on its initiatives. The importance of the involvement of the private sector is noted as needed and important.

Climate change poses a major threat to long-term development objectives, especially poverty reduction. Adaptation needs, more than the need to take measures for mitigation, are a priority in developing countries especially for the under privileged. Women and girls are bearing the major impact of climate change, e.g. access to water, food and employment. Natural disasters from climate change in countries like in Pakistan, Malawi and Ghana have been significant. Several countries such as the Philippines and Indonesia have already had to undertake significant disaster risk adaptation measures. With appropriate adaptation policies, countries can reduce impacts in the short term. But even with appropriate adaptation, successful development and poverty reduction require rapid reductions in global GHG emissions, which requires first and foremost accelerated mitigation action in high-income countries and other large emitters.

It is emphasized, especially by civil society, that green transition must be a just transition. Claims for loss and damage in developing economies from the effects of climate change should be considered for a just transition. Sharing the burden for adaptation is needed for a just transition. Many schemes for green finance are presently being undertaken that may not address the needs of the population. It is important to establish sustainability reporting standards that meet social goals such as those in the [WBG Environmental and Social Framework](#). The regulatory framework should include data systems and metrics for accountability. [Greening social accountability for climate finance](#) is necessary. The G20 has developed a report on [Digital Financial Inclusion: Emerging Policy Approaches](#) that can be used to establish equity in the green transformation.

### Consideration of Gender Equality in Development

No society can develop sustainably without transforming the distribution of opportunities, resources, and choices for men and women so that they have equal power to shape their own lives and contribute to their families, communities, and countries. Gender equality has been made a central theme for work at many international organizations, including the UNECE and other UN agencies. Funding organizations, such as the World Bank and IMF, have also made gender equality a priority topic to be addressed.

The adaptation needs in developing countries are most severe for the under privileged, especially for women and girls, that are bearing the major impact of climate change, e.g. access to water, food and employment. A policy for green transformation should include the establishment of opportunities for women for employment taking advantage of the digital public infrastructure, e.g. by establishing means for working from home and for easier trade. The digital technologies identified by UNIDO for a digital transformation discussed above that could benefit women should be examined for further advantages and benefits from the digital transformation.

Access to the internet for women to provide employment opportunities and e-commerce is a key to the transition and national development. This necessarily requires the digital transformation address rural agricultural areas and the needs of women businesses which are mostly micro and small enterprises. Women can take pride in earnings and by owning a financial account.

The World Trade Organization has published a report on [Women and Trade: The Role of Trade in Promoting Gender Equality](#). The goal of the report is to improve the understanding of the impacts of trade and trade policy on gender equality, and to provide policy makers with evidence on the benefits of trade for women and with potential policy solutions. Trade and trade policy can affect women, according to three key economic roles they play: workers, consumers, and decision makers. The empirical analysis in the report suggests that expanding trade can act as an impetus for countries to improve women's rights and boost female participation in the economy which leads to development



and an increase in GDP. This supports the contention that consideration of gender equality in a green and digital transformation is critical for national development.

## Conclusions and Recommendations

The regulatory framework, i.e. policies, regulations and international standards should be developed that will promote and utilize green and digital technologies to address the three pillars of sustainability—people, planet and prosperity—in line with the Sustainable Development Goals (SDGs). Any benefits to sustainability goals require sustainability concepts, including green transformation, to be a fundamental part of the digital transformation. Therefore, it is important to undertake digital transformation under the same umbrella policies as for green transformation.

Presently half of humanity has no access to the internet. International development organizations, jointly with civil society, are engaged to initiate a roadmap for digital equity. Digital equity is needed to end poverty and investment policies must address “human rights.” The infrastructure for a DPI is needed but also affordability of the services, development of the skills needed, and focus of the content to benefit the population. The whole package should be funded, not just the technology. Setting the policy is more important than establishing the technology.

Climate change poses a major threat to long-term development objectives, especially poverty reduction, and accelerated emission reductions are needed, particularly in high-income and other high-emitting countries. It is noted that reducing emissions can be done without compromising development. Low-carbon development strategies can reduce emissions by 70%, without significant impact on growth, provided that policies are well designed and financing is available. In lower-income countries, financing needs can exceed 5 percent of GDP, which will require more support from high-income countries, including increased concessional resources.

International collaboration is essential for international organizations, including civil society, to strengthen their roles in trust building and partnership mobilizing, actively engaging with their members and effectively leveraging collective efforts in international standards development and capacity building. In doing so, the impacts of digital and green technologies can be taken into account and their transformative capabilities can be better leveraged to strengthen all SDG pillars—people, planet, prosperity, partnership and peace.

Inclusivity and unity are key to success. The G-20 has recently put forth the policy of “One Earth, One Family, One Future” signaling the need for unity of purpose as well as the unity of action.

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