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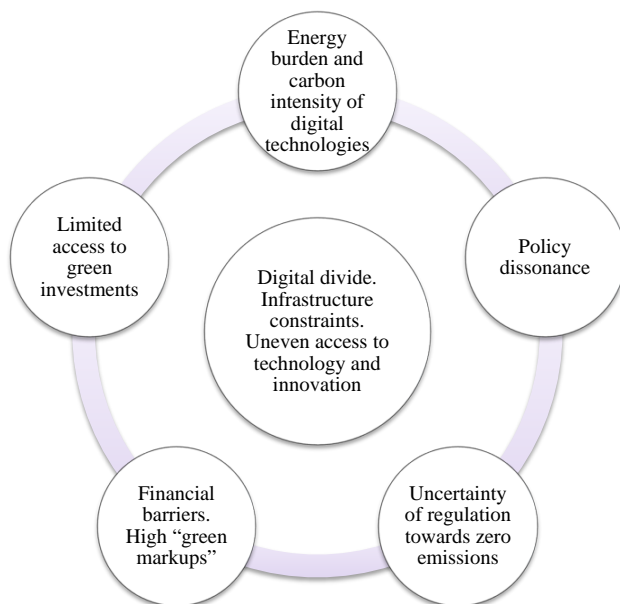
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## **STRATEGIC REFRAMING OF GREEN-DIGITAL TRANSITION IN THE CONTEXT OF CLIMATE NEUTRALITY AND GLOBAL EXTERNALITIES**

The contemporary global economy is confronted with a multitude of unprecedented challenges in its mission to achieve carbon neutrality and sustainable development. Governments, businesses, and society are adopting a variety of strategies to mitigate environmental impact, largely in response to global efforts to reduce greenhouse gas emissions and address climate change. Concurrently, the advent of digital technologies has facilitated new avenues for achieving these objectives, particularly through process optimization, enhanced resource efficiency, and decreased energy consumption. However, the pursuit of a climate-neutral economy is complicated by the presence of persistent global externalities.

The twin green-digital transition involves the coordinated implementation of digital and green technologies in the broader discourse of achieving sustainability in industrial, social and economic systems. These two powerful mainstream trends are complementary to achieve common goals, such as reducing greenhouse gas emissions, increasing energy efficiency, and introducing innovative technologies. However, such a twin transition requires some harmonization towards achieving global climate neutrality of the world economy, given the identified groups of negative impact factors (Figure 1).

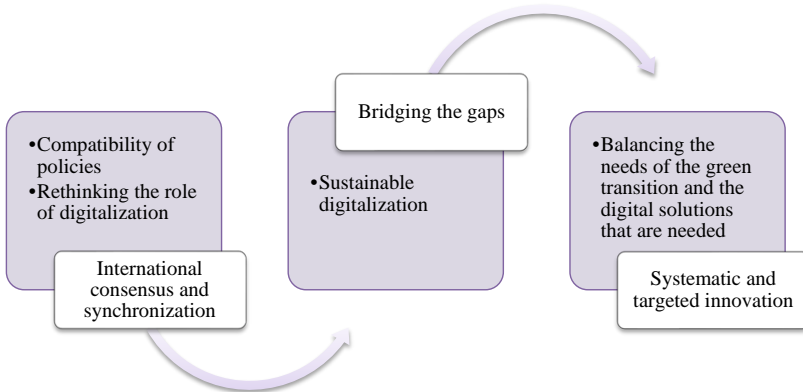


**Figure 1. Key barriers to digital transformation for climate-neutral development**

*Source: author's development*

These factors have a negative impact on the effectiveness of the green-digital transition towards ensuring the climate neutrality of the global economy. The poor level of digital infrastructure can be a serious obstacle to the digital transition, especially in regions with poor Internet coverage and low quality of communication [1]. On the other hand, although digital technologies have significant potential to support green development, they also create a significant energy burden, which may contradict the principles of decarbonization, especially with regard to the use of AI, blockchain, etc. A critical negative factor is the uncertainty of policies, inadequate regulation, and the lack of specific strategic goals for achieving climate neutrality, taking into account the role of digitalization in this process. This creates uncertainty for businesses and investors, slowing down the transition process [2]. In this context the idea of sustainable digitalization is becoming increasingly important due to the rapid pace of digital development in the world, which significantly affects the nature of energy consumption.

Therefore, the harmonization of the green-digital transition involves, first of all, strengthening the coherence between the green and digital transitions to ensure their better synergy towards achieving widespread emissions reductions and ensuring climate-neutral development of the global economy (Figure 2).



**Figure 2. Strategic dimensions for harmonizing the green-digital transition within global externalities**

*Source: author's development*

The first dimension of the harmonization of the green-digital transition is aimed at building an international consensus on the vision of climate neutrality of the global economy and the vision of the progressive role of digitalization in this process. This dimension involves several fundamentally important components, which have been identified based on the analysis of a number of scientific studies [1; 3; 4]:

- convergence of countries on the way to zero emissions;
- global development of digital competencies and sustainable digitalization;
- science and research (global R&D);
- promoting cross-sectoral innovation ecosystems;
- ubiquity and cross-cutting of norms and standards at the global level;
- coherence of global policies and national interests.

A key condition is to harmonize the vision, values, and goals of achieving climate neutrality of the global economy in the context of the digital era and sustainable development. Harmonization of the twin transition towards climate neutrality of the global economy requires convergence

among all key international actors towards zero emissions. On the other hand, an important aspect of this convergence is the use of the synergy of digitalization as a driver of accelerating environmentally sustainable, socially just and economically responsible development. This requires a rethinking of the purpose of digitalization, taking into account the development of common visions, values, and updated goals for a green transition in the digital age.

Therefore, the goal of digitalization in the context of a climate-neutral economy should be to create a sustainable and innovative infrastructure that minimizes greenhouse gas emissions and efficiently uses resources. This includes the development of digital technologies that automate and optimize production processes, increase energy efficiency, ensure transparency and control over supply chains, and support data-driven decision-making, leading to a reduction in environmental impact. The main goal should be to ensure sustainable economic growth through the integration of environmental and digital solutions that harmonize economic development with climate management goals.

Achieving this goal requires the formation of strong coalitions between public and private organizations, including academia and civil society, who are united in the realization of the dual green-digital transition and understand the importance of ensuring climate neutrality. Harmonization of the green-digital transition implies that local and global awareness of environmental and social values should be systematically integrated by actors with leading positions in existing and emerging digital technologies, innovations, and governance structures. At the same time, commitments to green development and multilateral climate agreements should be periodically reviewed in terms of their implementation through the lens of digitalization.

At the same time, the need to develop digital competencies is critical for the twin transition, as the digital divide directly affects the trajectory of digitalization and the unlocking of all its capabilities to meet the needs of green transformation. Studies show that many business entities currently lack the important digital competencies needed to effectively catalyze the transition to a climate-neutral economy. On the one hand, the public sector and political leaders need to understand the opportunities and risks of digital transformation in supporting decarbonization, building their own digital capabilities to effectively regulate, promote, and implement sustainable policies.

Despite a fairly broad discourse on international climate change agreements and arrangements, there remains a significant gap in the

regulatory and ethical framework for the green-digital transition and goal-setting towards climate neutrality of the global economy. This primarily concerns the development of standards that would guide the direction of digitalization with social sustainability and climate neutrality in mind. It is also critical to establish a global standard methodology for assessing and measuring the intrinsic impact of digital technologies on climate change. These efforts should include the management of data, which is becoming a new factor of production, alongside land, labor, and capital, and help to develop policies that support digital transformation in line with the goals of the green transition.

The next level of the strategic harmonization is to overcome the main gaps and inequalities of the digital-green transition that slow down the decarbonization of the global economy. These gaps are as follows:

- the digital divide;
- information distortions;
- unequal access to innovation and technology;
- inequalities of rights and obligations;
- capacity to consume “green margins”;
- uneven consumption of energy resources;
- emission reduction gaps: imbalance of adaptation and mitigation.

These gaps require special attention in the context of achieving climate neutrality of the global economy. The first of them is certainly the digital divide, which indicates unequal horizontal access to digital technologies among different regions and, at the same time, unequal vertical access to ICTs for different social groups. This issue is important to ensure that the benefits of the green transformation are distributed fairly. Over the past 20 years, the digital divide in the world as a whole has significantly decreased to 38.4%, but its scale varies significantly depending on the level of economic development of countries [5].

Another important gap is due to the existing global externalities in rights and obligations, which reflects the mismatch between what is required of countries, companies and citizens in the context of environmental initiatives and the resources and capacities they have. This gap often leads to conflicts of interest and delays in the implementation of green policies. Information distortions refer to distorted or insufficient information about environmental challenges and opportunities, which reduces the effectiveness of decision-making at both the consumer and policy levels.

On the other hand, an important aspect of global inequality in the context of achieving climate neutrality of the global economy is the ability to consume goods and services with "green markups". This indicates the economic ability of the population to bear the higher costs associated with green products and technologies. The gap in this regard is observed not only between individual countries with different levels of economic development, but also between different social groups, which violates the inclusiveness of the digital-green transition and, as a result, its effectiveness in achieving zero emissions of the global economy.

In general, gaps in the dynamics of emission reductions in different countries and industries provoke a certain imbalance of adaptation and mitigation, reflecting the unequal distribution of efforts and resources between measures aimed at mitigating and adapting to the effects of climate change.

Overcoming this barrier requires the development of at least 3 areas:

- 1) digitalization of national economic systems, taking into account the criteria of climate sustainability;
- 2) transparent monitoring and reporting on the implementation of legislation and achievement of climate goals;
- 3) subsidiarity and decentralized management to stimulate collective action and identify clear needs.

In general, the development of a climate-neutral economy requires prioritizing innovations that catalyze the green-digital transition. It is worth noting that in the current context of digital globalization, countries can gain numerous benefits from the "leap" to smart cities, buildings, transportation, agriculture, smart energy, etc. This effect is cumulative for the economy, as it stimulates progress in various industries, the development of new markets, and the emergence of new opportunities for global leadership.

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