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Program Europe's Future | September 2023

Economic diversification and greening of global value chains: Lessons from European regions

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The green and digital transformation is reshaping the technological landscape, rendering established technologies like the combustion engine obsolete while spotlighting emerging technologies like hydrogen production. For policymakers worldwide this seismic shift creates challenges and raises the prospects for future economic prosperity. In the following, I explore the key challenges and opportunities, present two successful policy models, and summarise the lessons to be learned.

My insights primarily derive from our recent study (Bertelsmann Stiftung 2023), assessing the potential of European regions to develop green and digital technologies. While the study's focus is on Europe, the findings resonate globally, particularly for emerging economies, which share similar challenges and opportunities with European regions on the up.

Navigating the challenges and seizing opportunities in green and digital technologies

Knowledge is key

The foremost challenge for policymakers, as well as business leaders, lies in the scarcity of comprehensive information about existing technological capabilities. This information gap permeates not only individual companies but also exists at regional and national government levels, rendering the scope for sound policymaking problematic. Developing countries, in particular, grapple with information deficits due to inadequate data systems.

But even with perfect information, developing regions still lack the required capabilities for technology development. These capabilities need to be nurtured by building on skills, creativity and infrastructure already present within a jurisdiction. This requires investment in both human capital and equipment.

In the context of green and digital technologies, there is more often than not a mismatch of the capabilities required and the ones available. Some existing capabilities may not be required any more, creating sunk costs. Effectively, the set of technological capabilities on hand needs to be adapted and expanded. Given limited resources (e.g. financial or human capital), acquiring the entire suite of technological capabilities is not an option. Therefore, prioritisation and specialisation are vital. Acquiring capabilities most urgently missing in the struggle to develop promising green and digital technologies with high economic returns is obviously the top priority.

Differences in technological capabilities

In our recent study, we analysed the technological capabilities present in different types of regions – including developing regions in Europe. We mapped their current capabilities with the requirements for developing green and digital technologies. For different types of regions, we measured the share of technological capabilities on

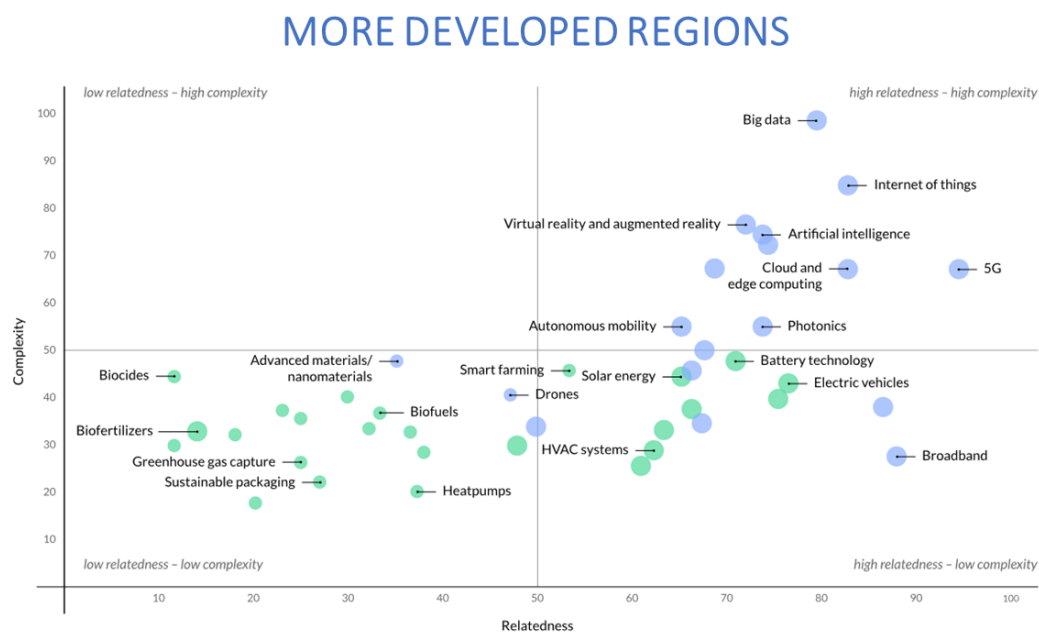


Figure 1: Technological capabilities of more developed regions in Europe.

TRANSITION REGIONS

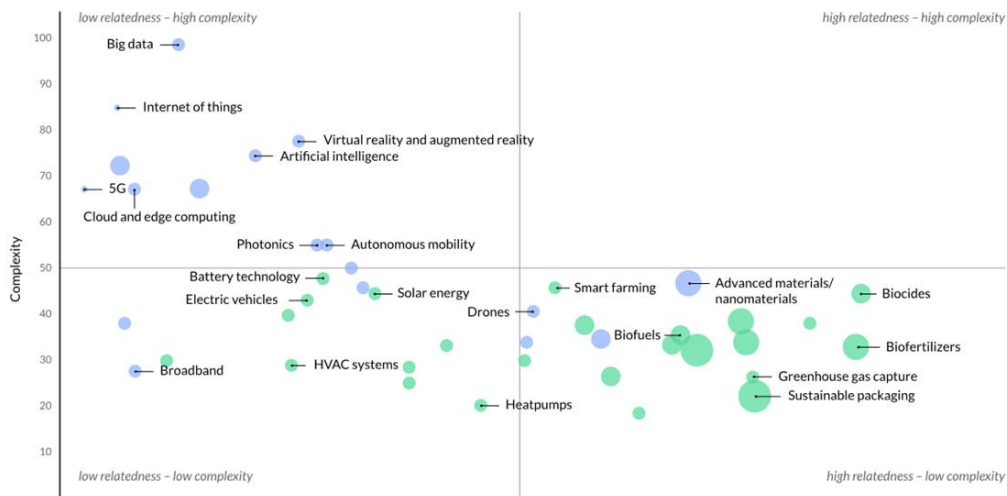


Figure 2: Technological capabilities of transition regions in Europe.

hand to develop a certain technology (relatedness). High relatedness means that there are few capabilities missing when it comes to developing that technology.

We also classified technologies by the difficulty involved in developing them (complexity). Technologies requiring many different capabilities are more complex but promise higher economic returns. Ideally,

regions should exhibit high relatedness in their capabilities with highly complex technologies. Policymakers should target these technologies to foster economic development.

Our analysis revealed that advanced regions in Europe have the highest match in the technological capabilities required to develop highly complex green and digital technologies

LESS DEVELOPED REGIONS

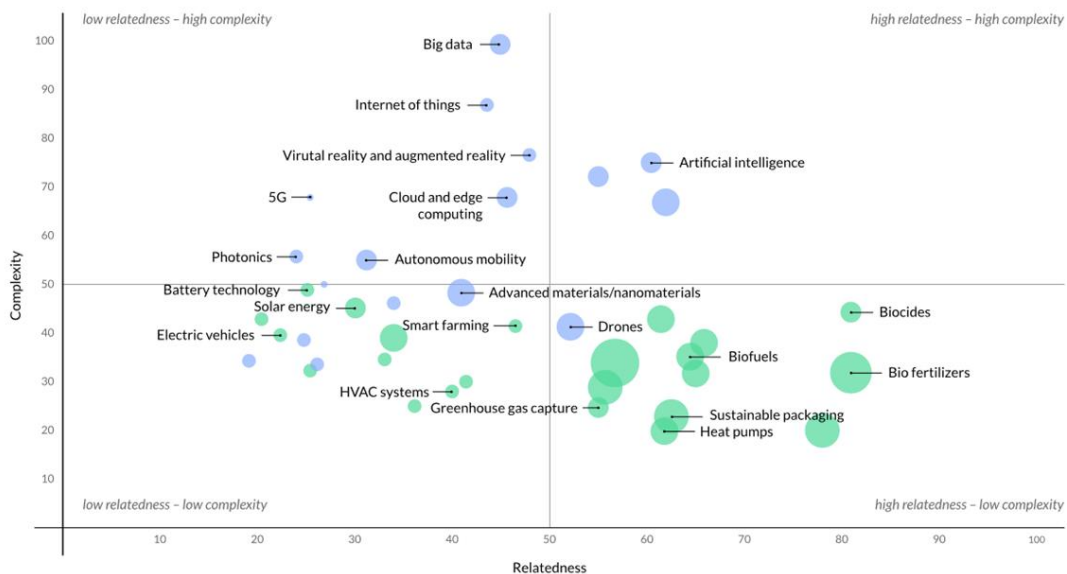


Figure 3: Technological capabilities of less developed regions in Europe.

(see Figure 1). Thus, they enjoy the best prospects for economic prosperity.

Transition regions (middle-income regions), meanwhile, suffer a worse outlook (see Figure 2). They face a trade-off between sticking to their current capabilities and developing low-complex technologies or investing heavily to acquire the additional capabilities needed to develop technologies with higher complexity and, thus, economic returns.

Less developed regions are, ironically, in a better position (see Figure 3). Although they are not overwhelmingly endowed with technological capabilities, they are blessed with significant potential for developing complex digital technologies such as Artificial Intelligence (AI). In the past, many of them demonstrated strength in this area. So, while their outlook is less bright than for more developed regions, it outshines that for middle-income ones.

Potential in collaborations

Not every region needs to possess all the capabilities to develop all green and digital technologies. Too many redundancies would be economically inefficient due to a waste of scarce innovation resources. Hence, collaboration is key. Bringing together and sharing complementary knowledge is beneficial for all jurisdictions involved. That's why there are already many collaborations in place across European regions (see Figure 4).

However, collaborations are so far too often confined to individual countries. And there is plenty of scope for more collaboration (see Figure 5). This potential is found in all types of regions. If it is untapped strategically by primarily addressing less developed regions, a win-win-situation may well emerge Technology development and economic

development forging ahead at the same time. To make this happen, less developed regions with their technological capabilities must be the primary location of choice when establishing collaborations.

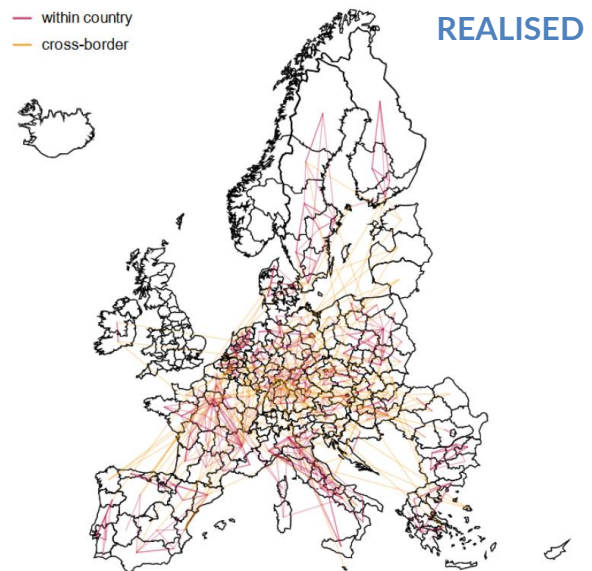


Figure 4: Current collaborations between European regions in developing green technologies.

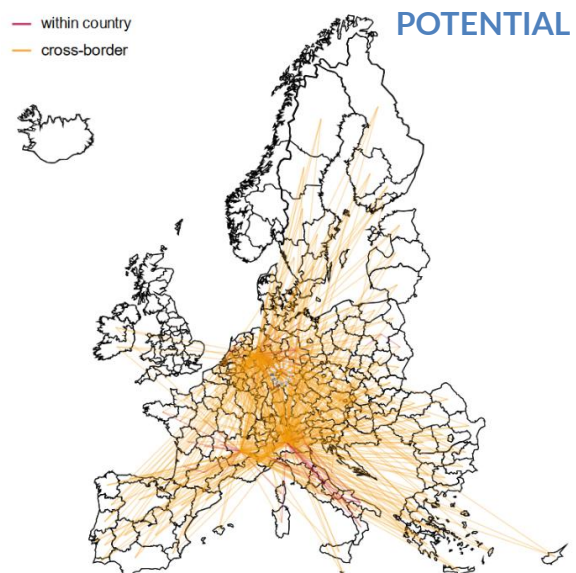


Figure 5: Untapped potential for collaborations between European regions in developing green technologies.

However, several frictions need to be addressed when setting up collaborations. Frictions start with lack of information on opportunities and end with competition

issues preventing collaboration for many reasons. Once these frictions are removed, developing regions in particular, with their limited technological capabilities, could benefit from international collaborations.

Two policy interventions to foster green and digital technologies in Europe

Given all these challenges and opportunities, Europe deploys different policies to foster innovation and sustain economic growth and competitiveness. Two policy interventions stand out: the Smart Specialization Strategy (S3) and Horizon Europe. While both share the overarching goal of leveraging technology development, their approaches are very different.

Smart Specialization Strategy (S3)

S3 embodies an innovation-driven approach that seeks to bolster regional development and competitiveness by harnessing a region's unique strengths and opportunities. It harnesses existing regional assets, competitive advantages, and capabilities to craft bespoke innovation strategies. The Entrepreneurial Discovery Process (EDP) plays a pivotal role, involving continuous stakeholder engagement in identifying fresh innovation opportunities.

S3 prioritises collaboration and networking among stakeholders, ranging from businesses and research institutions to government bodies and civil society. It endeavours to cultivate innovation ecosystems that facilitate knowledge exchange and cross-sectoral cooperation, with a keen focus on fostering inter-regional partnerships.

Clear priorities for innovation and development form another cornerstone of S3. These priorities undergo rigorous monitoring and evaluation to ensure policy-making and investment effectiveness, with regular feedback loops ensuring adaptability to changing conditions.

Horizon Europe

Horizon Europe represents the European Union's flagship programme for research and innovation. With a budget of €95.5 billion for the 2021-2027 period, it is one of the largest policy initiatives for promoting research and innovation globally. Beyond driving economic growth, Horizon Europe targets societal challenges such as the green transition through five designated "mission areas".

The programme staunchly supports scientific and technological excellence, prioritising projects showcasing high-quality research and innovation outputs. It encompasses both academic and non-academic R&D, bringing focused technology development in its wake. Unlike S3, Horizon Europe does not aim for universal regional capacity building; rather, it centres on excellence in technology development.

Horizon Europe strives to bolster innovation ecosystems by fostering collaboration between research institutions, industry, start-ups, and public authorities. It promotes new innovation hubs and clusters to enhance knowledge transfer and commercialisation. Synergy effects with funding programmes and initiatives at EU and member state level are exploited.

Since Horizon Europe is designed as an excellence initiative, it does not stop at European borders. Non-EU member states can and do join in. Horizon explicitly

promotes international research and innovation partnerships with developing countries. In a geopolitical context, Horizon entails the 'Team Europe' approach which addresses specific world regions. The 'Africa Initiative' (see European Commission 2023) is the most prominent one, aiming explicitly at collaborations between EU and African countries in technology development. A dedicated budget should boost these collaborations.

Lessons learnt

Both S3 and Horizon Europe have undergone continuous improvement. While S3 has successfully stimulated the development of technology and the overall economy in regions, it struggles to align technology development with the needs emerging from the green transition. Consequently, discussions now centre on advancing S3, potentially introducing "S4+" for sustainable and inclusive growth with the core target of aligning regional innovation strategies with the green transition (Muench et al 2022).

Horizon Europe has also evolved, with the current programme period witnessing an astonishing 50% budget increase to boost effective support. In its latest iteration, overarching missions to guide funding activities towards well-defined societal goals have been introduced. Further, greater emphasis is being placed on interdisciplinary solutions and enhanced cooperation between academia and business.

Charting the Path Forward

The green and digital transition presents a substantial challenge, especially for developing regions and countries. However, it also offers opportunities for advancement.

Radical technological shifts provide – especially for lagging jurisdictions – chances to play a role in new developing technologies.

Knowledge related to technology development is key and not only for the research and innovation process. Knowledge of a jurisdiction's technological capabilities is imperative to make the most out of it. But a strategic focus on developing further technological capabilities is also critical. Bringing together complementary knowledge is similarly vital. Acquiring comprehensive data on technological capabilities relies on effective information systems. This is a task that all stakeholders, government bodies, the private sector, academia, and civil society organizations must embrace.

Once technological capabilities are identified, they can be promoted strategically. Missing technological capabilities can thereby be built up from scratch or brought in via collaboration with others. Sharing complementary capabilities by collaborating across regions and countries is a fruitful and realistic solution. The European example shows that despite the many collaborations already in place, the untapped potential for bringing together complementary knowledge is huge.

Well-designed policy interventions are needed to systematically collect the relevant information on technological capabilities and set up successful innovation systems. The S3 strategy for Europe thereby serves as role model. But incentives to share capabilities are also required. Horizon Europe is designed to offer these. Beyond that, it also focusses on aligning research and innovation with addressing societal challenges via mission orientation. This is a challenging task with mission agencies increasingly seen as a

potential solution (see Bertelsmann Stiftung 2023b for example).

Ultimately, we need to maximize the efficient use of scarce resources in technology development globally. Addressing the pressing societal challenges of our era requires harnessing every ounce of effort, knowledge, and capability at our disposal. For developing countries, this opens new avenues towards prosperity just as evidence shows that progress towards achieving the UN's strategic development goals is faltering.

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