Risks and opportunities of the digital transformation

Towards more inclusive and sustainable international cooperation and development

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Il·lustració: Hansel Obando

According to Heeks [1], digital technologies have impacted international development in three particular ways: they now reach almost all low-income communities, both in urban and rural contexts (reach), they are relevant to almost all development issues and sectors (scope), and they play a vital role in all aspects of development processes (depth). Given the changing patterns in the field of international development these three impact dimensions can be associated with the major challenges: transformation (incremental developmental changes are no longer sufficient), inclusion (decision making beyond elite circles), and sustainability (development within the remits of planetary boundaries) [2]. Digital technologies have become the technical backbone of an ongoing transformation and of almost all economic activities; being the prerequisite for the seamless flow of data and information as well as goods and capital. However, the question, whether the ongoing digitalization will also contribute to the other two core themes, inclusion and sustainability, remains open.

Many governments and international organizations see great potential in digitalization for the socio-economic development and for a vital digitalized economy setting high expectations in the digitalization of the economy and its potential to drive the development of the industrial and service sectors [3]. However, many scholars argue that along with economic rationalization and increased efficiency, social and cultural values may be violated. They acknowledge a significant risk that the digital divide between developing countries and more technologically advanced countries could widen even further and that existing economic and social disparities will be reinforced at the expense of developing countries [4].

The following sections will address particularly the challenges of inclusion and sustainability. In addition, the policy implications for improving the present situation will be briefly discussed before the paper concludes with some general observations and lessons learned.

Inclusion: Access, digital divide and social equity

Access to digital services for domestic economies and industries

The effects of digital technologies can be studied at the individual, organization, country, region and global level. Common examples for constructs to measure economic effects are the GINI co-efficient (gap between poor and rich), the Purchasing Power Parity (ability to pay for needed goods and services), or the human development index (human capital and financial poverty). The latter is also used as a construct for the measurement of human well-being; other such indices are the Gender Development Index, or the Human Poverty Index. The digital part of the equation is often operationalized through indicators such as access to mobile phones, internet or broadband, information and communication technology (ICT) diffusion, robot installations, or volume of e-commerce per observation unit.

When looking at indices for equity or equal access to digital technology, many developing but especially African countries achieve only low scores. The share of population using the internet can be seen as one typical indicator in that regard (see Figure 1).

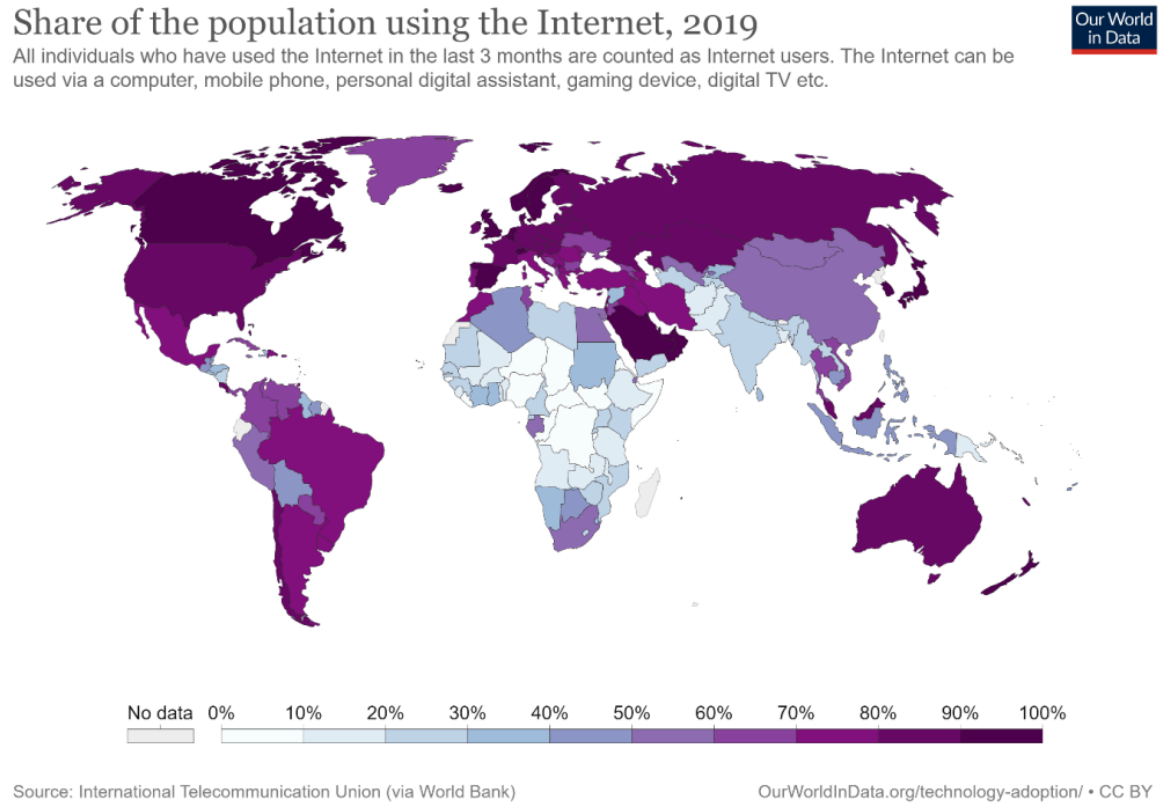
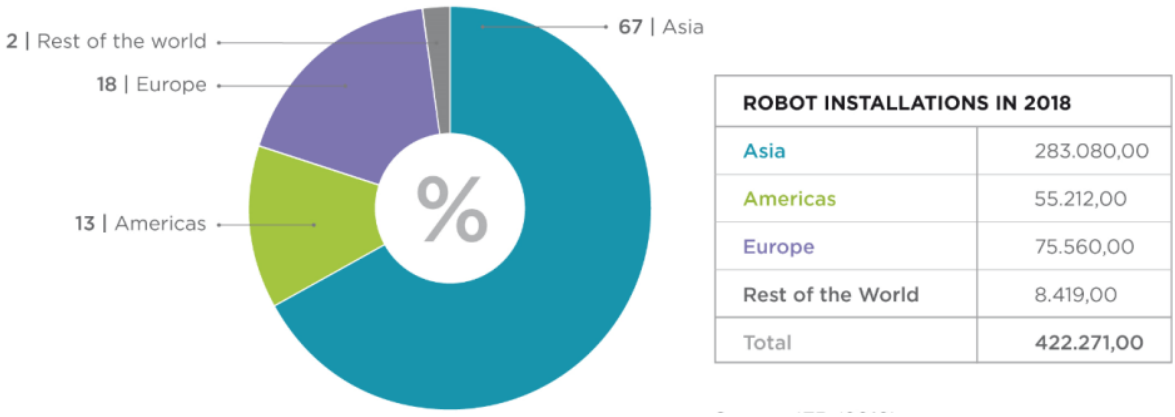


Figure 1: Share of population using the Internet in 2019 (retrieved from ourworldindata.org/technology-adoption CC BY).

With regard to industry-centered indices like robot installations, values are even more unevenly distributed globally (see Figure 2). 74 % of all robot installations occur in just five countries: USA, China, Germany, South Korea, Japan [5]. When neglecting China, as an immensely relevant player in this field, not a single developing country is playing a relevant role according to the statistical data.



ROBOT INSTALLATIONS IN 2018	
Asia	283.080,00
Americas	55.212,00
Europe	75.560,00
Rest of the World	8.419,00
Total	422.271,00

FFigure 2: Distribution of robot installations in 2018 [5].

Big IT brand firms outsource 80% of manufacturing to only five supplying manufacturers – all located in either North America, Taiwan and Mainland China [6]. Subsequently, the ICT sector is highly concentrated (see Figure 3): in 2017 only ten economies accounted for more than 90% of global value added in ICT manufacturing [7].

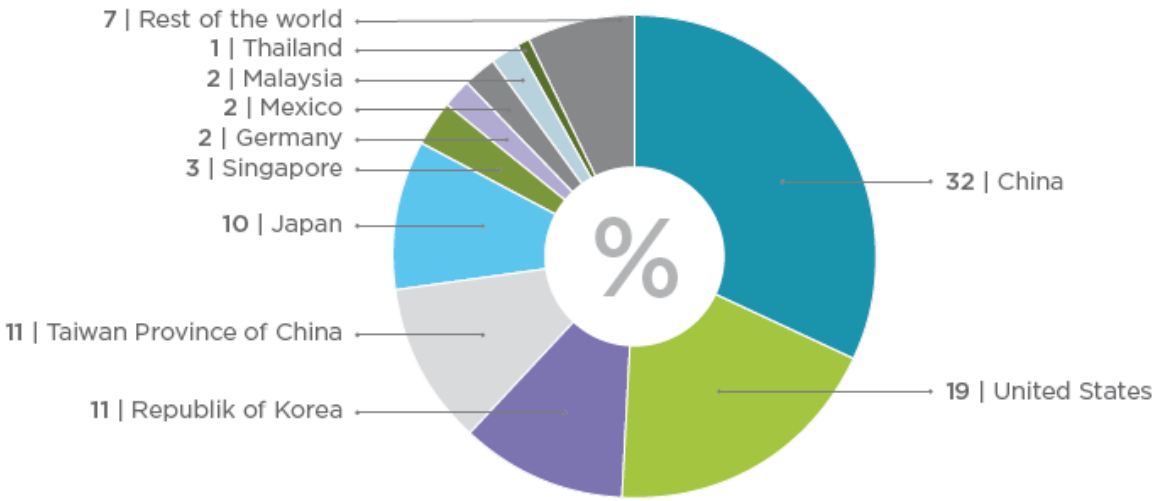


Figure 3: Distribution of value added in ICT manufacturing in 2017 [7].

Contribution to equity and social opportunities

Technological innovation can positively influence poverty alleviation [8]. An analysis from Mexico suggests that internet access helps to reduce poverty levels especially in rural areas [9]. A panel analysis shows that internet usage (if not related to internet scams) has a positive effect on economic well-being for countries in Sub-Saharan Africa [10]. E-commerce platforms do not only provide cheaper goods and services but additionally foster the development of rural and remote areas [11]. Following a similar approach, Li et al. [12] have suggested a model of poverty alleviation through e-commerce based on a case study from China. Several studies have explicitly emphasized the potential of digital technologies to address the issue of systemic poverty. Mbuyisa & Leonard [13], have found that the use of ICT by small and medium-sized enterprises (SMEs) act as a driving force for socio-economic development, such as poverty reduction. They see special benefits with regard to the use of intermediaries and community involvement [14] or social outsourcing to marginalized groups [15]. However, Galperin & Viecens [16] cconclude from their review of the published evidence that benefits from internet investments are favoring advanced economies, while their contribution for the fight against poverty in less developed regions remain uncertain.

There are indications that the use of mobile phones by micro and small enterprises have increased the well-being of the micro-entrepreneurs mainly due to greater price transparency and a reduction of waste [17]. In the context of entrepreneurship, mobiles phones help doing business by supporting communication in various ways: easing access to market information, getting paid through mobile payment solutions, reaching new customers and widening the geographical area, where products can be sold [18]. Furthermore, there is scientific evidence that mobile phones, as one specific information and communication technology, can empower women, for example by enabling their economic activity [19].

However, structural changes, such as patriarchal social hierarchies or the status of women in their community, are not necessarily triggered by the use of this technology [20]. On a similar notion, Gillard et al. [21] argue that solving existing gender issues should be seen as

a key topic in international development, as women are the key actors in a number of crucial areas, such as education, health, agriculture, and commerce, where digital technologies can make a difference. Baack [22] uggests to take advantage of the open data approach to support participation, empowerment but also more fundamentally democratic values. Digital social media platforms do generate a lot of digital data. However, even though they may contribute to development in the sense of providing opportunities for some individuals to earn a living or for companies to promote their products they also come with a number of potential risks, such as hate speech or cyber-bullying [23]. This is, of course true, for both, developed and developing countries.

As much as there is an agreement among most scholars in this field that some digital technologies and services have the capacity to improve inclusion and enhance equitable economic opportunities, there is major concern that the opportunities are not seized or even contracted due to economic power, governance failures and the neglect of other contextual factors such as regional cultural and social circumstances. Along that line, Walsham et al. [24] rgue that digital information systems need to be conceptualized as social systems, where technology should be regarded as only one of several dimensions. Even though many opportunities due to the application of digital technologies are mentioned in the literature for SMEs, Ahmad et al. [25] aargue that many from those which have adopted e-commerce have not managed to move beyond the entry-level partly because difficulties have arisen due to continuously advancing technology requirements and the high cost associated with necessary infrastructure.

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Providing access to all interested parties may conflict with market domination policies by powerful companies, creating special services for the poor may not be pursued by governments or administrative bodies and opening channels for engagement may not serve those who lack the education to seize these opportunities. At this point, the balance between opportunities and risks for equity and inclusion is still contested in the literature and it may depend on the local conditions whether the full potential of digital technologies and services has been or will be realized. As a means to study the evolving patterns of digital capacity building and use scholars need to recur to transdisciplinary approaches, that promise to integrate the perspectives, habits and requirements of non-academic and non-technological experts from the region where the technology is supposed to be rolled out [26].

Digitalization and employment

There are some indications that a digitalized manufacturing industry is less likely to booster employment in low-income countries [27]. Several studies suggest that a digitally

interconnected production is likely to raise skill requirements for workers [28]. Therefore, low paying locations might struggle to compete internationally with other better paying countries to attract qualified personnel for their industrial production. From a structural perspective, Matthess & Kunkel [3] also warn that “the skill bias of digital technologies may be a risk not only for equitable income gains, but also for inter-firm linkages”. With regard to the integration of smaller companies from developing countries into global value chains, Foster et al. [29] identify shifting modes of value chain governance and data standards as new challenges to digitally integrate.

Digitalization and sustainability

The overarching goal of sustainable development is a guiding principle for assessing and evaluating the impacts of digital technology and services. It is essential that all three dimensions of sustainability – the ecological, the economic, and the social – are taken into consideration and analysed in terms of their implications for development [30].

The ecological dimension

The three main objectives of ecological sustainability are decarbonization, dematerialization and renaturalization [31]. Digitalization offers ample opportunities to fulfil these three ecological goals. Digital platforms can provide communications and coordination services with a smaller carbon footprint in terms of mobility, material consumption, and land use. The substitution of energy and materials with information is one of the major promises for reducing human footprint on the environment. These opportunities are valid for developed as well as developing countries.

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But digitalization also brings about substantial risks for ecological sustainability. Due mainly to the growing number of devices and the increasing use of streaming and cloud services, the energy consumption of digital services and applications continues to rise [32]. This cancels out many of the energy savings made, for example, by substituting travel. Studies show that while modernizing production processes in accordance with Industry 4.0 is thought to lead to efficiency gains, in many cases no significant reduction in material and energy consumption can be demonstrated [33]. This is particularly true for developing countries where digitalization may not replace more energy intensive production but builds up new businesses and services. More clarity about the effects of Industry 4.0 technology use can probably only be gained through a longer-term evaluation.

The economic dimension

The economic dimensions of sustainability include: fostering the circular economy; ensuring long-term, socially protected employment; and preserving an economic system that is open, innovative, and competitive [34]. A future circular economy requires the combination with a broad variety of digital services. Circular economy has the potential to capitalise upon emerging digital technologies, such as big data, artificial intelligence, blockchain and the Internet of things [35]. These digital solutions and enhancing services will require comprehensive digital product identification, and compatible data standards covering the entire product lifecycle. Additionally, product-service systems are considered an essential business model innovation for achieving circular economy through digital means [35]. These are only two of several examples where digitalization has the potential to modify existing or create entirely new value chains. According to estimates, the global ICT sector grew from USD 1.3 trillion (10^{12}) in 1992 to USD 3.9 trillion in 2014 and currently accounts for 4.5% of global GDP [36]. However, this growth is unequally distributed among the world's nations as indicated above. In how far the Global South will benefit from this service is still highly contested.

In terms of innovation and the creation of employment, digital services and applications can help developing countries to establish innovative industries and new start-ups. But the reality of the ICT sector still lags far behind this ideal, in particular in developing countries. The quick replacement of devices (particularly smartphones) and at least an indirect encouragement of a throwaway mentality runs counter to the objectives of circular economy and recycling.

The social dimension

Three objectives can be identified in the context of the social dimension of sustainability: (i) equitable living conditions (intra- and intergenerational justice), (ii) sovereignty and active participation as well as (iii) social and cultural identification with the transformations and developmental pace [37].

While the fears of the 1990s that digitalization would lead to a digital divide within society, the problem now is that digital divide is particularly prevalent between countries. There is clear evidence that certain regions in the Global South are disadvantaged when it comes to using digital technologies or services [38]. Inequities start with a lack of access to fast internet connections and end with insufficient digital literacy. Furthermore, many digital technologies come along with an acclaimed digital lifestyle that often appears to be alien to the economic or social culture of many countries.

Policy implications

In many countries governments and state agencies consider the ongoing digital transformation as a big opportunity for socio-economic development. In developing countries digitalization is often viewed as a driver for growth and job creation as well as an

enabler of a more environmentally friendly industrial development [3]. Many governments and state agencies in those countries have developed policies and programmes to foster the emergence of knowledge-based economies. Promoting education and research, supporting the creation of innovative businesses, and upgrading electricity and telecommunication infrastructures have been preferred means for that purpose. Since the early 2000s approaches of this kind have increasingly tried to support and focus on the use of digital technologies [3]. Especially in China, the digital transformation is seen as a key driver and enabler for economic development and is supported by key policies such as the “Made in China 2025” strategy.

One of the big challenges in this transformation process is to design the according policies in a way that they support inclusion, while not aggravating the already existing digital and social divides through these measures. For that purpose, the core strategy of the African Union for the socio-economic transformation of the continent, the Agenda 2063, emphasizes the importance of science, technology, innovation but also explicitly education together with an expansion of digital infrastructures for the industrial development of the continent (explicitly including the strengthening of digital services). Based on the approaches presented in Section 2, the demand can be derived that inclusion should be given much greater priority in the future as a higher-level socio-economic goal of all policies aimed at digitalization, both at global and national level.

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When it comes to integrating the concepts of international development and sustainability within policies, consideration is also given to the concept of sustainable development as a more future-oriented vision [39]. Therefore, all policies striving to combine these two concepts should take the UN Sustainable Development Goals (SDGs) as their guiding orientation, to ensure that the intended socio-economic development is not only forward-looking, but also geared towards the well-being of people and the environment.

Conclusions

We are in the midst of two global transformations happening in parallel: the digital transformation and the transformation towards more sustainable development. One of the major challenges in shaping these transformations will be to narrow down the digital divide between the Global North and the Global South. Following the patterns of traditional industrialization pathways might economically not be a wise choice for many developing countries in this regard.

The research on ICT for development has suggested different approaches to tackle issues

like systemic poverty or economic exclusion. Nonetheless, Harris [40], states that research on ICT for development has failed the poor in the past, mainly because it is not sufficiently engaging to advance policies, it is often disconnected from real-world problems and is cursed by the need to publish its results. A similar criticism is also articulated with regard to overly simplistic analyses, which oftentimes focus solely on whether people have ICT access or not – instead a more complex ICT impact chain should be analyzed including communication capabilities, information literacy, and knowledge sharing abilities [41].

Many governments in developing countries see a lot of potential for socio-economic development in taking advantage of digital technologies [3] and have therefore increased their efforts to enhance digital skills and the required infrastructures for this transformation. Establishing a vital digital economy needs to come along with enabling framework conditions which strengthen ‘digital skills’; but also provide supporting ‘policies and regulations’ encouraging the development of innovative digital hard- and software solutions as well as digital business models [42]. Efforts were increased in many countries in the Global South to develop and produce ICT products and components, such as the first African smartphone Maraphone or the South-African original equipment manufacturer CZ Electronics, whose portfolio focusses on consumer electronics. Other countries see the formation of digital platforms such as Jumia (by the African Internet Group) a start-up from Nigeria, which has turned into a major e-commerce platform in sub-Saharan Africa [43]. However, policymaking will need to find a good balance between economic development, technological progress and the generation of employment opportunities to ensure this transformation will eventually be of an inclusive nature.

There are concerns that digitalization may lead to a reduced convergence in international cooperation. To reduce this effect and to achieve inclusion, skill development in low-income countries will be absolutely essential [42]. In addition, it must be ensured internationally that market entry and assertion remain viable even though the market is dominated by few major players. As a consequence, the investment climate should be improved, e. g. through direct financing opportunities and participation in global value chains (GVCs) [42]. A similar challenge, especially for enterprises from rural and remote areas, is the affordability and accessibility of the digital platform services for e-commerce [11]. o address these challenges support should be provided for digital infrastructure projects as well as important empowering areas such as education, research and innovation hubs.

Future research needs to tackle these issues and needs to clarify which technology-, and sector-specific interactions will lead to beneficial linkages between processes of structural change and digitalization in countries of the Global South [44]. But most importantly, the ongoing digital transformation has to be shaped in a way that digital technologies support the improvement of education, health systems and livelihoods while also contributing to a more environmentally sustainable and inclusive way of living.

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