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Digitalized economies in Africa

Structural change in a dynamic environment

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Digital technologies are important tools for the flow of goods, capital, knowledge, data and ideas around the globe. Many countries in Africa see potential in digitalization for their socio-economic development and are seeking to strengthen the basis for a flourishing digitalized economy. However, with profound political and socio-economic transformations unfolding across the continent, key questions for the international governance of the digitalized economy unresolved and a looming global economic crisis, the prospects for the digital development of African countries are growing increasingly uncertain. There is a high risk that the digital divide between African countries and more technologically advanced countries could widen even further and that already existing market imbalances will be reinforced at the expense of developing countries. This factsheet provides a concise and fact-based overview of various aspects of the digital transformation of African economies and is intended as a basic introduction to this topic.



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Policies and processes for African digitalized economies

Over the past decades, many African governments have developed policies and programmes to foster the emergence of a knowledge-based economies, e.g. by promoting education and research, supporting the creation of innovative businesses, and upgrading electricity and telecommunication infrastructures. Since the mid-2000s, such efforts have increasingly focused on leveraging the use of digital technologies to create social and economic benefits and to spur the development of a digitalized economy (see Box 1). While research paints a mixed picture of the economic impacts of digital technologies in developing countries, many African governments and international organizations set high expectations in the digitalization of the economy and its potential to drive the development of the industrial and service sectors and improve agricultural production. Moreover, digitalization is often viewed as an important driver for growth and large-scale job creation and as an enabler of more environmentally-friendly industrial development in developing countries (Kunkel & Matthess, 2020).

Against this backdrop, the Agenda 2063, the African Union's (AU) core strategy for the socio-economic transformation of the conti-

nent, highlights the role of science, technology and innovation in education and for industrial development as well as the expansion of communication infrastructures and digital services across the continent. One of its flagship projects is the creation of a Pan-African network that is intended to make "the information revolution the basis for service delivery in the bio and nanotechnology industries and ultimately transform Africa into an e-Society" (African Union undated). Moreover, in late 2013 seven African heads of state launched a Smart Africa Manifesto, which was endorsed by all heads of state and government of the AU in early 2014 (Smart Africa 2020). Currently, the Smart Africa Alliance counts 30 member states representing a total population of approximately 750 million people and has partnered up with a broad range of major telecommunication companies (ibid.). Its overall aim is the creation of an African single digital market. As such, the Smart Africa Alliance has become a centre-piece of African digital development efforts. Furthermore, in December 2018, the European Union (EU) and the AU launched the EU-AU Digital Economy Task Force (EU-AU DETF), which aims at guiding the EU and AU in their efforts to strengthen cooperation on the digitalized economy (European Commission undated).

Box 1: Segments of the digitalized economy

The concept of a "digitalized economy" is used as an umbrella term for a wide range of economic activities linked to information and communication technologies (ICTs), such as the internet, big data and artificial intelligence (AI). Given their broad scope and the constantly advancing technological change, there is no generally accepted definition of the digitalized economy. Still, three core segments of the digitalized economy can be identified (Beier et al. 2020):

- The ICT sector providing basic infrastructures, equipment and services that make the use of ICTs possible in the first place,
- E-commerce and online or digital platforms whose business models are almost entirely built on the use of ICTs and the internet,
- Users of digital solutions in other sectors, such as mechanical engineering and agriculture, which apply digital technologies and business models primarily to supplement and enhance their existing value creation model.

Today, many companies cannot be clearly assigned to one or another segment of the digitalized economy. The ubiquity and spread of digital solutions into different segments of the economy makes it increasingly difficult to clearly draw the boundaries of the digitalized economy.

Framework conditions for the digitalized economy in Africa

There is a wide range of factors that affect the development of the digitalized economy in Africa and they vary significantly from country to country.

Still, some general societal, technological, economic, environmental, and political (STEEP) factors and trends can be identified that help to better understand the broader context of the digitalized economy in Africa.

Table 1: STEEP factors for a digitalized economy in African countries

Factor	Selected characteristics
Societal	<ul style="list-style-type: none"> Nearly three out of five Africans are younger than 25 years (UNECA 2016). Population growth remains high but is expected to slow down in the coming decade. Africa is undergoing rapid urbanization, with approx. 40% of the population living in urban areas in 2015; by 2050 this number is expected to reach 56% (UNECA 2018). There is a strong rural-urban divide with respect to access to employment, education, infrastructures, and public services. Over the past three decades, civil society in Africa has become increasingly active and diverse. However, in many sub-Saharan African countries the space for civil society actions is shrinking due to increasing government restrictions.
Technological	<ul style="list-style-type: none"> More than 590 million people lacked access to electricity in 2016. The average electrification rate in rural areas stands at 25%, while in urban areas it is 71% (IEA 2017). In 2018, the number of unique mobile subscribers rose to 456 million (GSMA 2018). It is expected to reach 600 million by 2025, with smartphones becoming more prevalent (ibid.). Between 2011 and 2016, internet access doubled in Africa and reached approx. 22% of the population, yet large differences exist between and within African countries (UNECA 2018). The science, technology and innovation landscape in Africa is still at an early stage, except in some countries like South Africa, Kenya, Morocco, Tunisia and Egypt. In 2015, average R&D expenditures accounted for only 0.4% of GDP (UNECA 2018).
Economic	<ul style="list-style-type: none"> Economic performance depends heavily on political stability, integration into global value chains and natural resources. Many African countries struggle with a low diversification and high dependence on the extractive sector. Informal labour plays a pivotal role in many African economies. Between 2000 and 2015, Africa's average growth rate stood at 4.8% annually (UNECA 2017). The share of Africans in extreme poverty has fallen from 54% in 1990 to 41% in 2015. Over the same period, the absolute number of poor has increased from 278 million to 413 million due to population growth (Beegle and Christiaensen 2019). Poverty is most severe in rural areas.

Table 2 (continued): STEEP factors for a digitalized economy in African countries

Factor	■ Selected characteristics
Environmental	<ul style="list-style-type: none"> • In 2016, sub-Saharan African countries emitted an average of 1.9t of CO₂e per capita compared to a world average of 6.8t and 4.0 t in the Middle East and North Africa (Climate Watch undated). • Energy use in sub-Saharan Africa has increased by 45% since 2000. Bioenergy accounts for 60% of total energy use (IEA 2014). Coal is the second most important energy source due to its large-scale use in the South African power sector (ibid.). Modern renewable energies such as wind and solar power account for less than 2% of the energy mix. • African countries generate approx. 1.9 kg/inhabitant of e-waste per year (Baldé et al. 2017). Few African countries have enacted e-waste regulations and policies; collection rates are largely unknown (ibid.). The continent has become a major destination for e-waste exports.
Political	<ul style="list-style-type: none"> • Stability varies significantly across the African continent. Armed conflicts have decreased in scale and number. However, armed non-state actors remain a persistent threat. • While more and more countries in Africa are experiencing longer periods of peace, political turmoil and social unrest often erupt around elections and during times of economic crisis. • There are increasing efforts to strengthen regional cooperation. The implementation of the African Continental Free Trade Area (AfCFTA) is a major step to enhance economic cooperation among the 54 members of the African Union (AU). The AU has also played an important role in coordinating efforts of African states in dealing with the coronavirus pandemic.

Production of ICT equipment and components in Africa

The global ICT hardware industry is one of the most important goods-producing sectors. Estimates show that the ICT sector grew from USD 1.3 trillion in 1992 to 3.9 trillion in 2014, accounting for 4.5% of global GDP (Selvan & Kalyanasundaram 2015). However, the ICT sector is highly concentrated. In fact, only ten economies accounted for 93% of global value added in ICT manufacturing in 2017, led by China, the USA and the Republic of Korea (UNCTAD 2019, see Figure 1). In addition, branded IT firms outsource 80% of manufacturing activities to only five contract manufacturers (Foxconn, Flex, Jabil Circuit, Celestica, Sanmina-SCI), which are all located in either North America or Taiwan and Mainland China (Raj-Reichert 2018). Given that these companies invest steadily to strengthen their ties with branded firms located in the Global North, it is questionable whether African companies can achieve beneficial integration into global ICT manufacturing

value chains in the short term. For most African countries, the ICT sector current plays a minor role compared to other domestic industries related to ICT manufacturing, such as mining (see Box 2). There are only a handful of African countries (e.g. Rwanda and Mozambique), with a share of high-tech exports greater than 10% of the respective country's overall exports (UNECA 2018). Still, there are noteworthy exceptions that highlight the growing efforts of many countries to deliver ICT products and components 'Made in Africa'. One example is the *Maraphone*, the first Rwandan (and African) smartphone, which was launched in 2019. With a reported production capacity of 1.5 million devices annually and a price of approx. USD 200, it could garner attention beyond the African continent. *CZ Electronics* is a South-African original equipment manufacturer with a broad portfolio in consumer electronics. As the company states, it is built around the idea of specifically addressing African requirements and retaining skilled workers in

African manufacturing (CZ Electronics undated).

Whether these cases remain unique success stories of African ICT manufacturing depends not least of all on future pathways of ICT manufacturing in the currently dominating countries as well as subsequent changes in the global geography of production.

E-commerce and platform economy in Africa

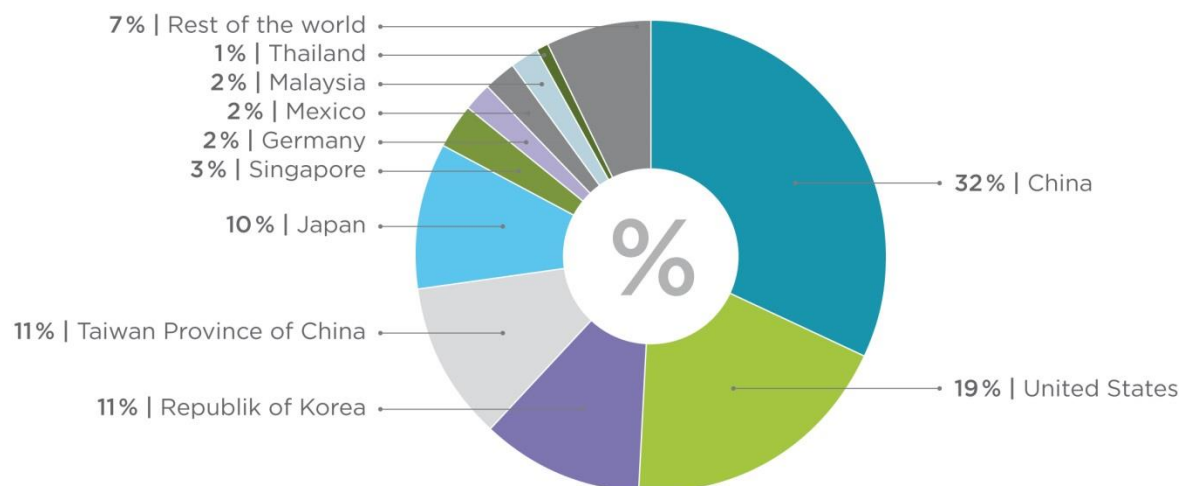
The global platform economy is dominated by US-American and Chinese platform enterprises, such as Apple, Amazon, Alphabet, Tencent and Alibaba, which – with their hundreds of millions of users worldwide – draw unprecedented benefits from network effects, both financially and in terms of their ability to draw on user data to optimize their services and business models. The low internet penetration rate in most African countries is a less favourable environment for these platforms. However, against the backdrop of a generally upward economic trend across the continent prior to the outbreak of the coronavirus pandemic as well as strong efforts to diversify and modernize African economies, many platform companies and investors have discovered African countries as promising markets.

For example, in 2012 Rocket Internet founded the Africa Internet Group, which encompasses platforms in the areas of e-commerce,

fashion, real estate, hotel bookings, jobs market and ride-sourcing in many Sub-Saharan African countries (Evans and Gawer 2016). Jumia (“Zando” in South Africa), a Nigeria-founded start-up that was launched by the African Internet Group, has become one of the major e-commerce platforms in sub-Saharan Africa and is the first African start-up to be listed on the New York Stock Exchange (Thomas 2019). Its success earned the company the nickname “African Amazon”. Uber has been active in Africa since 2013 and claims to have 36,000 active drivers in sub-Saharan Africa. The company now plans to further expand its services to Western African countries aside from Ghana and Nigeria (Akwagyiram 2019). With the Electronic World Trade Platform (eWTP), the Chinese e-commerce giant Alibaba has also sought to intensify its business in African countries (Africa News 2018). Despite several global platform companies operating in African countries, a recent report concludes, that most of Africa’s platform economy is “home-grown” (Smit et al. 2019). Focusing on eight sub-Saharan African countries, the study identified 277 platforms, of which 222 were of African origin. The top three thematic types of platforms were online shopping, including food delivery (91%), freelance (75%) and e-hailing, such as e.g. car-pooling (53%).

The development of the platform economy could have major effects on African labour,

Figure 1: Geographical distribution of value added in % in ICT manufacturing in 2017



Quelle: UNCTAD (2019)

Box 2: Global mining and its impacts

ICT manufacturing requires the extraction of various minerals and developing countries are major contributors to global mineral production. China is the biggest mining nation, contributing 23.5% of global mining (BMNT, 2019). Still, mining is also significant in many African countries. The Democratic Republic of Congo produced 1,000,000 metric tons of copper in 2017, 5.5% of global production. Zimbabwe is the largest producer of lithium in Africa, accounting for 1.5% of global production (ibid.).

Countries hope for mining to provide a stimulus to the national economy, increase incomes and provide business opportunities. Thus, reliance on the extractive sector is high relatively high in Africa. For instance, the contribution of mining to GDP in the Democratic Republic of Congo, Botswana and South Africa was 12%, 9%, and 7% respectively in 2016 (Ericsson & Löf 2019). However, mining is linked to a range of detrimental socio-ecological effects. These include human rights violations, poor working conditions, and the unequal distribution of economic benefits. Moreover, total energy consumption of mining activities is estimated to be 6.2% of total global energy consumption (Holmberg et al. 2017), resulting in a substantial contribution to greenhouse gas emissions.

which remains to a significant extent small-scale and informal. Platforms such as Uber provide new opportunities for employment. However, studies show mixed results with regard to the benefits and challenges for platform workers (Lakemann and Lay 2019; Zollmann and Ng'weno 2018). Furthermore, many African countries have made strong, yet often unsuccessful efforts to formalize labour relations over the past decades and online platforms pose new challenges for governments to collect income taxes and VAT (ibid.).

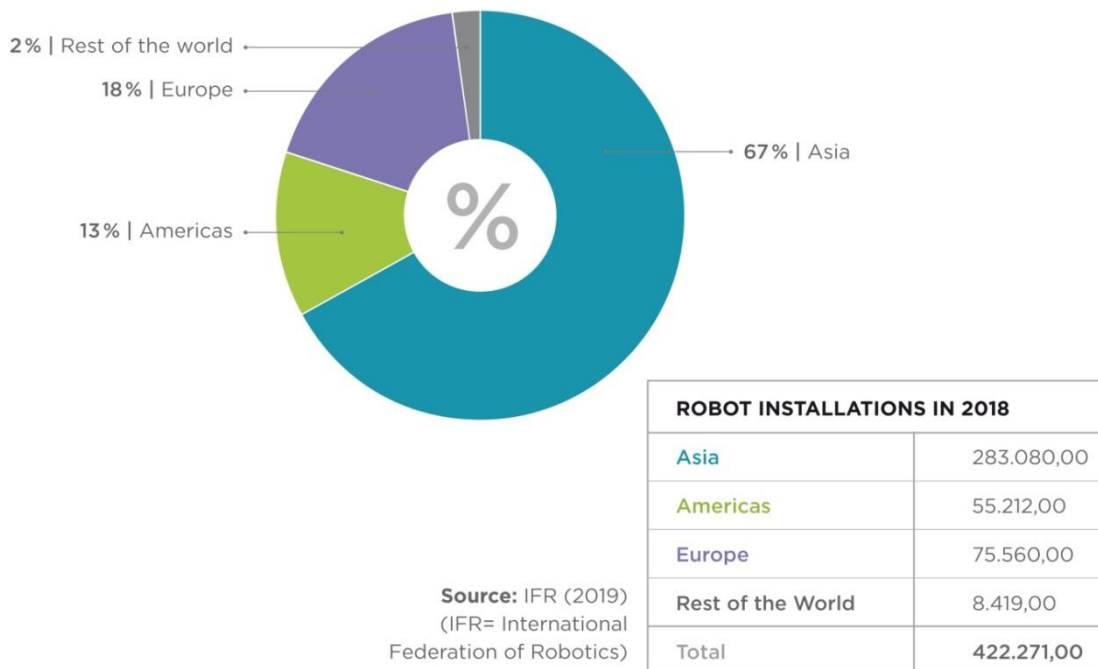
Digitalization of industrial production in Africa

African leaders are determined to harness the potential of digitalization for industrial development and view digitalization as a stimulus for structural change (see, e. g., The Kenya National ICT Master Plan, Ministry of Information Communications and Technology Kenya 2014). For instance, an AU Technical Committee Meeting in March 2020 revolved around the idea of tackling youth unemployment by digitalizing industrial production in African countries (African Union 2020). These and similar efforts are in line with the Union's goal of promoting manufacturing as a priority

area of the Agenda 2063. However, concerns have been raised as to whether this vision of digitally-driven development is a desirable and realistic one for the majority of African countries (Research ICT Africa 2020). Misplaced assumptions abound, for example: the expectation that the environmental burdens associated with industrial development automatically decline with the introduction of digital technologies is by no means a foregone conclusion (Kunkel & Matthes, 2020).

There is little data available on the degree of digitalization in industry for African countries. However, some indices provided by the private sector and international organisations demonstrate a restrained starting position for African countries in leveraging the expected potential of the digitalized industry. Looking at the parameters of "digital readiness", such as ICT investments and technology adoption, African countries receive low scores. For instance, South Africa is ranked as the most digitally advanced African country by several indices, including Huawei's Global Connectivity Index and ITU's ICT Development Index, but still ranks among the bottom half of the countries analysed in these global rankings (Huawei, 2019; ITU 2017).

Figure 2: Global robot installations in % in 2018.



Quelle: IFR (2019)

Taking robot use as a proxy for the degree of digitalization in industry, Africa’s share of global robot sales is reported to be 0.2 % in 2015; while 74 % of all robot installations occur in just five countries (USA, China, Germany, South Korea, Japan) (Banga & te Velde 2018; IFR 2019). Figure 2 shows the distribution of global robot installations in 2018. However, there are niches within which digital technologies are employed in industrial production in African countries. For instance, South Africa has an advanced AI strategy in place (Research ICT Africa 2020). Companies test applications of robots to detect security issues in mines, for instance the start-up Ryonix (Vernon 2019). The Africa-wide initiative “The African Robotics Network (AFRON)” wants to strengthen African entrepreneurs’ and inventors’ capabilities to develop low-cost robots fit for African contexts. An example of intensified efforts is the Rwandan government’s plan to establish a robotics cancer screening training centre in 2020 (Vernon 2019).

The digitalized industry represents a double-edged sword for African countries: On the one hand, digitalization typically increases productivity in industry, which in turn increases international competitiveness and fosters the participation of African firms in international trade. On the other hand, introducing automation and elaborate digital

technologies to industrial production processes is likely to raise skill requirements for workers and decrease the number of workers needed to produce the same output (WTO 2017). As a consequence of this, industrial production is less likely to create employment opportunities in low income countries (Ugur & Mitra 2017). Low-wage locations struggle to compete with other countries to attract industrial production. For instance, research suggests that furniture produced in the USA using digitalized and automated manufacturing technologies will be more affordable than furniture produced in Kenya by 2034 (Banga & te Velde 2018). In light of these circumstances, industrial and digital policymaking on the African continent will need to strike a careful balance between technological advancement and the creation of employment opportunities.

Conclusions and prospects for Africa's digitalized economies

- As the African Union's report on Africa's Development Dynamics acknowledged, traditional industrialization pathways have become increasingly uncertain (African Union 2020b). The pursuit of development patterns that have made countries economically successful in the past century might not be a wise choice for African governments, especially anticipating the enormous structural changes needed across the globe to limit global warming to 1.5 °C (IPCC, 2018). Many African countries see socio-economic development potentials in digital technologies and have increased their efforts to enhance digital skills and infrastructures since the early 2000s. However, many challenges remain, such as improving equality in access to ICTs by raising the affordability of devices and data packages, enhancing digital capabilities and infrastructures and providing funding for companies with novel business models.
- Moreover, the space for successfully occupying niches and parts of the digital value chain is very limited as the digitalized economy is dominated by only a few large players, making successful market entry and assertion increasingly difficult. One heavily disputed area in this regard is the regulation of global e-commerce. There has been growing concern among developing countries, particularly India and South Africa, over efforts by countries of the Global North to prohibit customs duties on the transfer of data across border, which would undermine the ability of countries in the Global South from capturing the value of data generated within their national borders.
- Recent developments related to the coronavirus pandemic may further diminish the capacities of African states to foster digital transformations. While the pandemic has led to a push for digital solutions in Africa, it will most certainly have strong negative social and economic effects on African states (UNECA 2020). In the long term, the economic aftershocks of the coronavirus pandemic could slow down infrastructure projects and limit spending in important areas such as education, research, innovation and environmentally-friendly economic development.
- Against this backdrop, African countries would benefit from not losing sight of the potential benefits and pitfalls of digital technologies for socio-economic development. Digital technologies could be harnessed to improve education, health and livelihoods as well as fostering more environmentally sustainable ways of production and consumption. African governments can contribute to more socially and environmentally beneficial uses of digital technologies by, among other things, tackling privacy and data security issues or setting environmental standards for ICT's energy and resource consumption as well as for the collection and recycling of e-waste.

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