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*Digital Technologies and Africa's
Development: Building A
European Union Development
Policy Framework For Africa*

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Abstract: *Digital technologies are playing a key role in development as they contribute to greater inclusion, increase efficiency, and enhance innovation. Africa however, is not realizing the broader development benefits from using digital technologies. Therefore, this paper aims to discuss why and how the European Union should mainstream a digital approach into its development policy towards the region. As such, this paper makes the case for 3 priorities to be implemented into its strategy: 1) To make connectivity more accessible, affordable and secure. 2) To provide digital solutions for growth, job creation and entrepreneurship and 3) To develop digital literacy and digital skills.*

Key words: *digitalization, digital dividends, development, Africa, European Union*

Resumen: *Las tecnologías digitales juegan un papel principal en el desarrollo, ya que contribuyen a una mayor inclusión, aumentan la eficiencia y mejoran la innovación. Sin embargo, África no está recibiendo la totalidad de los beneficios relativos al desarrollo que impulsan las tecnologías digitales. Por lo tanto, este documento tiene como objetivo discutir por qué y cómo la Unión Europea debe incorporar un enfoque digital en su política de desarrollo hacia la región. Como tal, este documento defiende la implementación de 3 prioridades en su estrategia: 1) Hacer que la conectividad sea más accesible, asequible y segura. 2) Proporcionar soluciones digitales para el crecimiento, la creación de empleo y el emprendimiento y 3) Desarrollar la alfabetización digital y las habilidades digitales.*

Palabras clave: *digitalización, soluciones digitales, desarrollo, África, Unión Europea*

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List of Abbreviations

AfDB- African Development Bank

AI- Artificial Intelligence

AR- Augmented Reality

DRC- Democratic Republic of the Congo

DSM- Digital Single Market for Europe

EIB- European Investment Bank

EU- European Union

GDP- Gross Domestic Product

GeSI- Global e-Sustainability Initiative

ICT- Information and Communications Technology

IoT- Internet of Things

ITS- Intelligent Transport Systems

ITU- International Telecommunications Union

MENA- Middle East and North Africa

OECD- Organization for Economic Co-operation and Development

SDGs- Sustainable Development Goals

TFP- Total Factor Productivity

UNESCO- United Nations Educational, Scientific and Cultural Organization

UNCTAD- United Nations Conference on Trade and Development

1. INTRODUCTION

Digital technologies—the internet, mobile phones, and all the other tools to collect, store, analyze, and share information digitally—have spread rapidly all over the world. Never before have people, businesses and governments been as connected to each other as today. This digital revolution brings development benefits such as increase in growth, expansion of opportunities and the improvement of service delivery. However, Africa seems to be falling behind in the adoption of these technologies, which is hampering the development of the region.

In 2015, the United Nations General Assembly approved the 2030 Agenda for Sustainable Development, which addresses the importance of information and communication technologies. This would be what would trigger on a global scale the research, initiatives and efforts regarding the use of ICTs to eradicate poverty, protect the planet and foster prosperity. Although the 2030 Agenda sets out a comprehensive, universal vision, the European Union development policy is a critical component of the overall EU response to that Agenda.

With this in mind, the purpose of this paper is to promote development in Africa by providing a digital approach to the European Union development policy towards the region. As such, this paper first carries out a state of the art that explores the current state at which the topic stands. The role and the current status of the topic goes at different paces; therefore, it first looks into the role, achievements and aspects not yet explored at the international level, then the EU, and finally the private sector. Second, a theoretical framework is presented with Ronald Coase's theory regarding transaction costs, which lays the foundation of how the internet promotes development. Third, the objectives and questions are posed, which are followed by an explanation of the methodology used to address them. Then, the analysis and discussion consists of a proposed EU development policy framework towards Africa, therefore making the case for 3 priorities to be implemented into its strategy: 1) To make connectivity more accessible, affordable and secure. 2) To provide digital solutions for growth, job creation and entrepreneurship and 3) To develop digital literacy and digital skills. Finally, the paper concludes with the most relevant findings and the strongest arguments in favor of implementing the proposed development policies.

2. STATE OF THE ART

Since the beginning of the millennium, there has been an interest in the impact that ICTs can have in the promotion of development. However, it wasn't until the United Nations General Assembly approved the 2030 Agenda for Sustainable Development in 2015, that the research in the field really triggered. The new focus arises from the rapid pace at which ICTs are penetrating in each country, which lead to a new array of opportunities and benefits that digitalization can bring to developing countries. In Africa, mobile subscriptions per 100 inhabitants have leaped from 12 in 2006 to 80 in 2018. As a consequence, there is an increasing interest in the impact of digitalization on development.

This section aims to collect the state of affairs of the digital approach in the EU development cooperation policy towards Africa. It aims to shed light on how much it has been researched on the topic, by whom, the achievements and the aspects that are yet to be explored. As such, the state of art will be first reviewed on the global context, then in that of the EU, and finally in the private sector. Overall, International Organizations are leading the research, providing figures, analysis and policy recommendations or guidelines. These institutions seem to be pulling the carriage, for States and the private sector to take action. In May 2017, the EU launched “Digital4Development”, which aims to mainstream digital solutions into its development cooperation policy. However, even though a special focus on Africa has been announced, the information, empirical evidence and arguments backing why and how the EU should have this new approach in its policy – in particular regarding Africa- is still in the crib of research. Finally, the role of the private sector has been key to provide the empirical evidence required. However, their substantial research contribution is not going in parallel to actual company activities in the African region.

2.1 International Organizations

In 2015, the United Nations General Assembly approved the 2030 Agenda for Sustainable Development, which addresses the importance of information and communication technologies. This would be what would trigger on a global scale the research and importance of ICTs for development.

In the 2030 Agenda, the Ninth Goal of the Sustainable Development Goals is to “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”. It further continues explaining that “*Investments in infrastructure – transport, irrigation, energy and information and communication technology – are crucial to achieving sustainable development and empowering communities in many countries. (...) Without technology and innovation, industrialization will not happen, and without industrialization, development will not happen.*” Within this Goal, Target 9.A makes a special reference to the facilitation of sustainable and resilient infrastructure development to African countries¹, as it is the region considered to face the largest challenges in this field. Furthermore, overall the Agenda refers to ICT as a cross-cutting “Means of Implementation” in the goals related to health (SDG3), education (SDG4), gender equality (SDG5), jobs and growth (SDG8), environment and climate change (SDGs 13, 14 and 15) and in peace, justice and strong institutions (SDG16); this highlights the role ICTs can have to pursue the different development goals.

Following the adoption of the Sustainable Development Goals came various initiatives such as the World Summit on Information Society (WSIS + 10) in December 2015. In this High-Level meeting of the General Assembly, Africa is again particularly referenced as the region where the lack of access to affordable and reliable technologies and services remains a critical challenge (United Nation General Assembly, 2015).

The World Bank’s 2016 World Development Report on digital dividends² is the first approach to review the impact that technologies have had on development. This Report is a significant step in the advancement of research and in the implementation of adequate strategies as it provides facts, an analysis and policies to which countries can attain to, shedding light on the road to follow. Indeed, the WB 2016 Development Report serves as the main and largest public source of empirical evidence and data regarding the role of ICTs in development.

The International Telecommunications Union (ITU) together with the United Nations Economic and Social Commission (UNESCO) are leading the United Nations Broadband Commission for Sustainable Development. The ITU/UNESCO Broadband Commission

¹ Goal 9, Target 9.A of the Sustainable Development Goals: Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

² “Digital dividends” are considered to be the broader development benefits from using digital technologies.

advocates for a stronger focus on the development of broadband infrastructure and services, and to ensure that the benefits of this technology is realized in all countries (Broadband Commission, 2017). As such, its flagship “State of Broadband” annual report is key to understand the current status of broadband around the world, and how it is contributing to development purposes. It explores global trends in broadband connectivity and technologies, development in policies and regulation, important applications of broadband for sustainable development and it presents some policy recommendations.

The “State of Broadband” report of 2017 sheds light on how broadband technologies are driving substantial transformation in different sectors, and how it is accelerating the achievement of the Sustainable Development Goals. It points out the Internet of Things (IoT), automation, machine learning, Intelligent Transport Systems (ITS), Artificial Intelligence (AI), sensor networks, computational modelling and Augmented Reality (AR) as recent advances and trends that can contribute very positively to economic and social development worldwide (Broadband Commission, 2017). Furthermore, the policy and regulatory frameworks must also keep up with the rapid pace of technological change. The report advocates for an “appropriate regulation”, where governments need to consider whether to pass sector specific legislation or whether existing legislation is sufficient to maintain principles of law “on and off-line” (Broadband Commission, 2017). In addition, the Report claims that using mobile data for social good requires technical capacities that in many cases is lacking globally and in particular in Low and Middle-Income Countries. As a consequence, donors' support towards the digital sector has gradually shifted from financing infrastructure to providing assistance for digital policy and regulatory frameworks and digital capacity building (European Commission, 2017).

There also exists a debate on whether ICTs and automation are creating or destroying jobs and whether they are improving the working conditions. Thus far, many consider it is too early to reach a conclusion. However, the OECD Report “The Next Production Revolution” suggests that overall employment and economic effects from ICTs have proved to have a positive effect (OECD, 2017).

At the same time, the World Economic Forum offers the “Shaping the Future of Digital Economy and Society” Initiative. It contributes positively to the international discourse on digitalization mechanisms for development as it carries out different projects; including the “Internet for All” Initiative or the “Internet of Things” project regarding the

role of IoT in harnessing the benefits of sustainable development.

All in all, even though International Organizations are thus far leading the discourse on the topic, they have only recently begun to increase the research in the field. Most specifically, it has mainly been since the adoption of the Sustainable Development Goals of the 2030 Agenda in 2015 where the role of ICTs is highlighted, that the international community has begun to study the role of digitalization in development to reinforce its importance.

2.2 The European Union

The 2030 Agenda for Sustainable Development brought along different initiatives and a new approach on the importance of ICTs to eradicate poverty, protect the planet and foster prosperity. Although the 2030 Agenda sets out a comprehensive, universal vision, the European Union development policy is a critical component of the overall EU response to that Agenda. As such, on the 2nd of May of 2017, the European Commission launched “Digital4Development”, a strategy to mainstream digital technologies into EU development policy.

Ever since the beginning of the millennium, the EU has favored the promotion of digital technologies and services in partner countries to further achieve the SDGs (European Commission, 2017). However, it has lacked the appropriate framework for mainstreaming digital technologies into its development policy. On November 2016, the Proposal for a New European Consensus on Development particularly stated that “*The EU and its Member states will continue to develop their support for promoting information and communication technologies in developing countries as powerful enablers of growth*”³(European Commission, 2016). It is in this same document that Africa is mentioned for the first time in the possible digitalization development policy: “*Digital technologies are being adopted in the developing world at an unprecedented rate. However, lack of connectivity, mainly in Africa, and limited competition make*

³ Point 46 of the Commission Communication concerning a proposal for a New European Consensus on Development. November 26th 2018.

*digital technologies unaffordable for the majority of the population.*⁴ (European Commission, 2016).

The Proposal for a New European Consensus on Development would be followed by the Foreign Affairs Council conclusions on “Mainstreaming digital solutions and technologies in EU development policy” (Council of the European Union, 2016), which call attention to the importance of digital solutions for development and briefly enunciates the course of action, yet no reference is made on the African continent. As a result of the Foreign Affairs Council conclusions, the European Commission set out a Staff Working Document which outlines the Commission’s approach to mainstreaming digitalization into EU development policy, giving birth on May 2017 to the aforementioned “Digital4Development” strategy.

The Commission Staff Working Document “Digital4Development: mainstreaming digital technologies and services into EU Development Policy”, sheds light on the importance of digital technologies for development in different sectors, highlighting current limitations, new challenges and opportunities. It further describes the main priority areas and possible types of actions and measures. The Digital Single Market for Europe (DSM) strategy adopted in May 2015 recognizes the significant impact that digitalization has on growth and job creation within the European economy (European Commission, 2017). Consequently, the European Commission considers the DSM for Europe, and in particular the eGovernment Action Plan 2016-2020 a great scope that brings key aspects of digitalization which can be translated into development cooperation policy (European Commission, 2016). While digitalization is considered as a global interest, the Staff Working Document on “Digital4Development” acknowledges that it will not be possible to implement the measures in all developing countries at once, and not at the same pace. Therefore, the European Commission officially puts the main and immediate focus in Africa, as it recognizes that the digital divide there is the greatest (European Commission, 2017). Within the African region, the African countries that are building on the interests and consensus of the local partners and the first priority countries identified under the European Agenda on Migration receive particular attention (European Commission, 2017). It is for this reason that in the “Medium term (2018-2020)

⁴ Point 45 of the Commission Communication concerning a proposal for a New European Consensus on Development. November 26th 2016.

indicative type of measures” proposed by the Staff Working Document, all of the types of actions are targeted to either the African Region or have a Global focus. Nevertheless, the measures are broad and seem to lack the specific arguments, data and analysis that prove the importance of streaming digital solutions in the EU development policy towards Africa.

On April 16th 2018, a debate on the European Digital4Development policy was held in the framework of the United Nations Conference on Trade and Development (UNCTAD) E-Commerce Week 2018, with the week’s theme being on the development dimension of digital platforms. Mariya Gabriel, EU Commissioner for Digital Economy and Society highlighted that the EU was aiming to support its African partners in the creation of a pan-African digital single market (European External Action Service, 2018). Dr. Amani Abou- Zeid, African Union Commissioner for Infrastructure, Energy, ICT and Tourism also stressed the relevance of working together with enterprises in the process of digitalization (European External Action Service, 2018). The importance of mainstreaming digital solutions in the EU development policy towards Africa indeed goes hand in hand with the actions of the private sector.

With regards to digitalization for development policies carried out on behalf of EU Member States, a number of countries -Belgium, Estonia, France, Germany, United Kingdom, Finland, the Netherlands, and Sweden- have publicly announced or are currently in the process of publishing Digital for Development Strategies. There are common grounds on these national policies, such as the introduction of the digital approach into development cooperation, the use of national digital know-how or the support for local innovation (European Commission, 2017), to name a few. However, the approaches vary among EU Member States. For example, Germany and France follow a two-fold approach where digitalization is both gradually mainstreamed into priority sector programs and also targeted as a unique sector with specific interventions. Whereas for Sweden and the United Kingdom, digitalization in its development cooperation is a cross-cutting issue increasingly integrated in the programs and aid delivery systems (European Commission, 2017).

However, there has been little analysis of the actual impact of ICTs on development on behalf of the EU. “Digital4Development” thus far provides a vision, but has not yet made a case for the new development measures that should take place, nor does it study the ICT

needs in Africa. Understandably, little can be done and measured in a year (if we bear in mind that the strategy was officially announced on May 2017, and the research conducted for this paper was between September 2017-June 2018); yet it is due to this gap in the research that this paper argues for the need of a digital approach in the EU development cooperation policy towards Africa in particular.

2.3 The Private Sector

The private sector takes an important role in the use of technologies to promote development. The involvement of the private sector is key in data collection, increase of research, public-private partnerships, implementation of projects and the sharing of technical know-how to local companies and people. Surely, their participation is fundamental for the achievement of the Sustainable Development Goals.

For instance, Ericsson has studied the relationship between ICT maturity and economic, social and environmental development for cities and countries. According to its Networked Society City Index report, there is a correlation of 0.85 between the SDG development index and ICT maturity, suggesting countries with high ICT maturity also rank highly in terms of fulfilling the SDGs (Ericsson, 2016). When studying how the diffusion of mobile broadband impacts economic development in terms of GDP, Ericsson together with the Imperial College found that mobile broadband is significantly associated with GDP, and that it is the increase in mobile broadband penetration which is driving GDP development (Ericsson, 2016). These sorts of results are enriching the investigation regarding the impact of ICTs on development.

The role of ICT companies has been especially relevant in the finance sector. In 2014, in its Communication “A Stronger Role of the Private Sector in Achieving Inclusive and Sustainable Growth in Developing Countries”, the European Commission highlighted the importance of digital technologies *"as a tool for achieving financial inclusion of the poor, especially in Africa where they are already dramatically changing the financial landscape"* (European Commission, 2014).

The need for Public-Private Partnerships is also unquestionable. These partnerships are not only currently providing support to target the lack of digital skills in the human workforce (European Commission, 2017), but they are also a key piece in the advancement of the empirical research regarding the impact of digitalization on development. The Global e-Sustainability Initiative (GeSI), distinctively counts with the participation of the private sector to meet the challenges of sustainable development. The initiative is a strategic partnership of the ICT sector -representing around 40 of the world's leading ICT companies- and organizations that aim to create and promote technologies and practices that foster economic, environmental and social sustainability. Their multiple reports have reached important findings that favor the digital approach. For example, they've found that digital solutions have up to 23 times higher diffusion speed and reach than traditional approaches, or that 1.6 billion people are benefitting from e-healthcare (Global e-Sustainability Initiative & Accenture Strategy, 2016).

All in all, the private sector has a key role in reaching the Sustainable Development Goals. Thus far, they are playing an important part in the advancement of the research, yet more action measures would be desirable. The social responsibility of a few ICT companies is driving them to launch projects and invest in the African region, yet the activity is far from changing the development landscape.

3. THEORETICAL FRAMEWORK

3.1 Theory of Transaction Costs

In order to understand how technologies can promote development, it is important to understand what they actually do. For this purpose, an old economics theory can be brought to present day to explain the implications of ICTs in the new economy. In 1937, Ronald Coase -who would receive the Nobel Prize in Economics in 1991- published “The Nature of the Firm” where he developed the concept of transaction cost and its influence on the existence of firms.

The theory of transaction costs tries to explain why companies exist, and why companies expand or source out activities to the external environment. The transaction cost theory supposes that companies try to minimize the costs of exchanging resources with the environment, and that companies try to minimize the bureaucratic costs of exchanges within the company (Rindfleisch, Heide, 1997). These costs with the environment include mostly the effort of finding buyers or suppliers, and negotiating contracts and enforcing them. Therefore, companies weigh the costs of exchanging resources with the environment, against the bureaucratic costs of performing activities in-house. If the cost of making an exchange of a good or service in the market is higher than the profit from that exchange, then it is rational for a firm to produce it in-house (Coase, 1937).

When studying his theory of transaction costs, many of these costs have to do with the acquisition or the sharing of information. If the theory is brought to present day, we can observe how the internet and other digital technologies have reduced these costs significantly. This has had major implications for market and non-market exchanges among businesses, people and governments, which have also promoted economic development. From this we can call attention to the reason why ICTs have had such an impact on development; they can distribute, offer access and provide large amounts of information. Therefore, the digital technologies this paper refers to are those that greatly facilitate the creation, storage, analysis, and sharing of data and information. As such, this paper uses “internet”, “digital technologies” and “Information and Communication technologies (ICTs)” interchangeably.

Through digital technologies, there are less transaction costs and the cost of the transaction also decreases. As a result, digital technologies contribute to greater inclusion, efficiency, and innovation (World Bank, 2016). Figure 1 explains these three ways identified by the World Bank in which the internet promotes development.

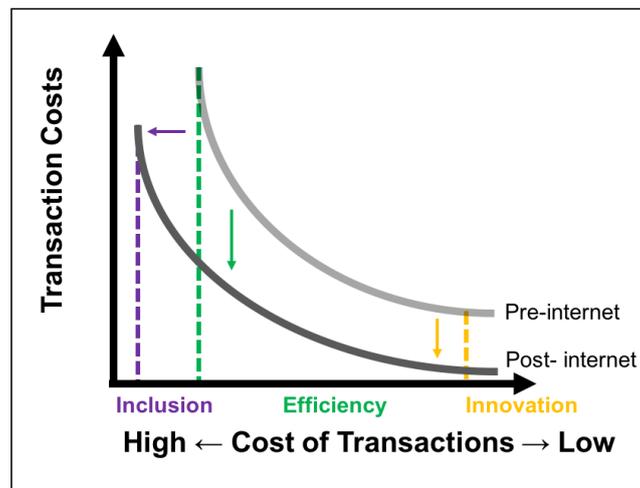
First, the internet contributes to greater *inclusion*. In many cases, a transaction or exchange does not take place because the two parties involved simply do not have the way to find out about the other, or because a party doesn't feel it has enough information to carry out the transaction. In this case, the transaction costs are very high; in fact, the transaction costs can be so high that there is essentially no market- the transactions don't take place (as seen from the Pre-Internet curve in Figure 1). However, the internet, by vastly lowering search and information costs, promotes inclusion and market expansion (World Bank, 2016). For example, small workers and businesses from poor countries can now access global markets and earn higher returns from the service or product they trade. Many poor or disadvantaged populations will now receive public services because governments can use digital IDs to verify their eligibility (Gelb; Clark, 2013). All in all, by breaking the information barrier, the internet favors inclusion.

Second, the internet has brought large gains in *efficiency*. Better communication and information processing improves supply chain management and enterprise resource planning (World Bank, 2016). The internet has reduced costs for businesses when connecting and negotiating with buyers or suppliers, finding workers through job-matching services, and monitoring contract fulfillment or employee performance (World Bank, 2016). Also, purchasing goods, engaging in a financial service, searching for a job can be done with just a click instead of having to make a trip to the shop or office. These gains in efficiency also extend to governments. Overall, the internet promotes development as it makes transactions faster, cheaper, and/or more convenient. It is in efficiency where one can see the largest gains from the internet, and from which Ronald Coase focused his theory.

Third and last, the internet has led to enormous *innovation* that is typically associated with the “new economy” (World Bank, 2016). For many internet-based businesses or services, fixed up-front costs can be high, but once the online platform is in place, each additional customer, user, or transaction incurs very little extra cost (World Bank, 2016).

As a result, the marginal transaction cost essentially drops to zero (as seen in Figure 1) because what previously involved human labor can now be fully automated. These ultralow marginal transaction costs have driven to scale economies and new business models -mainly new web services that operate in platform markets.

Figure 1. How the internet promotes development looking at the transaction costs theory



Source: Own elaboration with information from the World Bank 2016 Report

In conclusion, using Ronald Coase's theory of transaction costs we can understand how ICTs can promote development. Essentially, the World Bank identifies three ways in which the internet leads to further development: through inclusion, efficiency and innovation (World Bank, 2016). As such, we use this theoretical framework as the foundation of why and how the European Union should implement digital solutions into its development policy to Africa.

4. OBJECTIVES AND RESEARCH QUESTIONS

The purpose of this paper is to promote development in Africa by providing a digital approach to the European Union development policy towards the region. Therefore, this paper aims to discuss why and how the European Union should mainstream a digital approach into its development policy towards Africa. As such, the following research questions were asked:

- How do digital technologies promote development?
- What is the impact of the internet, mobile phones, and related technologies on the economic development in Africa?
- Where does digitalization have a higher impact in development?
- What are the potential gains from digital technologies and how are they being realized in the Africa?
- What are the restraints of Africa benefiting from digital technologies?
- How does the digital divide affect Africa?
- Which solutions for the global digital divide are suggested?
- In what is Africa particularly lagging behind in terms of digitalization?
- Why is the European Union a key player in the promotion of development in Africa? And under the digital approach?
- What is an adequate development policy framework for mainstreaming a digital approach in the EU development strategy towards Africa?

As a result of these research questions, three priority areas are identified: 1) Accessible, affordable, and secure connectivity, 2) Digitalization for growth, job creation and entrepreneurship, and 3) Digital literacy and digital skills. Therefore, having established the three objectives, this paper aims to respond to the following questions:

- *Objective 1:* Shed light on the need for open, affordable and secure connectivity in Africa

- Why is an accessible, affordable and secure connectivity important? What are the opportunities? What are the challenges?
- How has connectivity reached Africa as compared to other regions?

- What are the mobile phone adoption rates and the internet adoption rates?
- What African countries, areas or population groups have the lowest access to connectivity?
- How affordable is connectivity?
- What are the risks that should be taken into account?
- Why and how should the European Union focus its development interventions in this priority area?

- *Objective 2:* Explore how digital technologies foster growth, job creation and entrepreneurship

- What has been the impact of digital technologies in growth?
- How does connectivity affect firm and worker productivity?
- What role do ICTs play in job creation in Africa?
- How do digital technologies foster entrepreneurship?
- Why and how should the European Union focus its development interventions in this priority area?

- *Objective 3:* Study the importance of digital literacy and digital skills

- Why are digital literacy and digital skills important? What are the opportunities? What are the challenges?
- What is the digital literacy rate throughout the different African countries?
- How do digital literacy and digital skills assure that the benefits from digital technologies are realized by all?
- Why and how should the European Union focus its development interventions in this priority area?

5. METHODOLOGY

For the appropriate development of this research paper, the following methodology was followed:

First, a qualitative exploration of primary and secondary literature has been carried out in order to understand the role digital technologies play in the development of Africa. Subsequently, research was conducted in relation to development interventions in Africa under the aforementioned scope. As a result, the different actors that have led the promotion of development through digital technologies, their contributions and the gaps that remain to be filled have conformed the state of the art section. In addition, this first step as well as research on how connectivity promotes development have been used to develop a theoretical framework that would serve as a basis to properly analyze the role of digital technologies in Africa's development, and why the EU should reinforce its development efforts in this regard.

With regards to digital technologies and its link to development in Africa, empirical evidence is particularly important. While conducting research, there has been a special effort to obtain the primary sources of data from which most literature parts from. In this way, the World Bank, the OECD, the International Telecommunication Union (ITU) and the Research ICT Africa have been the main sources of data; the analysis of the data provided has been carried out through the research paper.

Data collection, management and visualization has been necessary to illustrate the digital adoption by businesses, people and governments in Africa as compared to the European Union. This has contextualized why the European Union should include the digital approach into its development policy towards Africa. The following methodology was used: first, data regarding GDP per capita and the digital adoption by businesses, people and governments was collected from the World Bank data base. Only the data from African countries on the one hand, and from EU member states on the other was gathered and put in an excel sheet. The collection and classification of data was proceeded by a visualization through a dispersion graph, where each region was identified by color. The GDP per capita was put into logarithmic scale as the data covered a wide range of values

and the logarithm reduces them to a more manageable range. These steps were taken for each classification: for businesses, for governments and for people.

On the other hand, although the empirical-descriptive research was key to give solid argumentations to this paper, a normative research was equally as important. Normative research differs from descriptive studies because the target is not only to gather facts but also to point out in which respects the object of study can be improved. In this way, in order to propose an adequate policy framework for the EU, research on EU communications, resolutions, memos, official strategies, projects, programs and reports of the main and relevant EU institutions has been essential. This has allowed the author to recommend adequate policies and strategies for the EU.

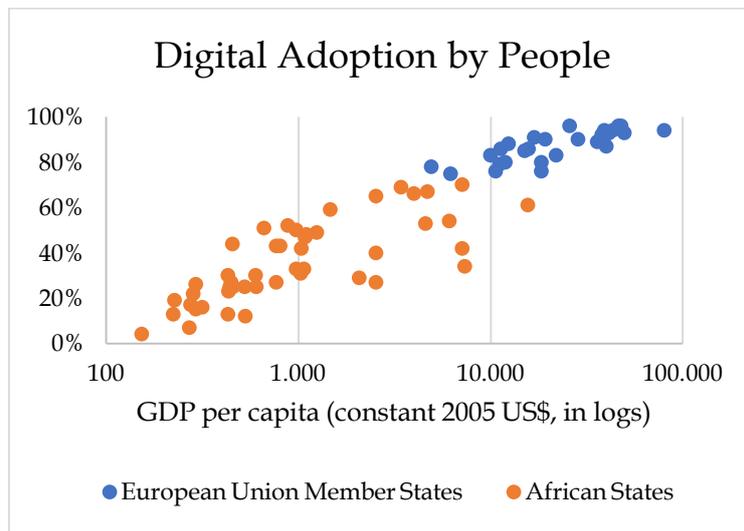
Finally, once the analysis was carried out and the results discussed, the main findings and conclusions of this study have been gathered and summarized.

6. ANALYSIS AND DISCUSSION

Digital technologies—the internet, mobile phones, and all the other tools to collect, store, analyze, and share information digitally—have spread rapidly all over the world. Nonetheless, there still remains a divergence in digital adoption between higher and lower income countries. This draws attention to the important role the EU has in bridging that gap by implementing an adequate development policy framework.

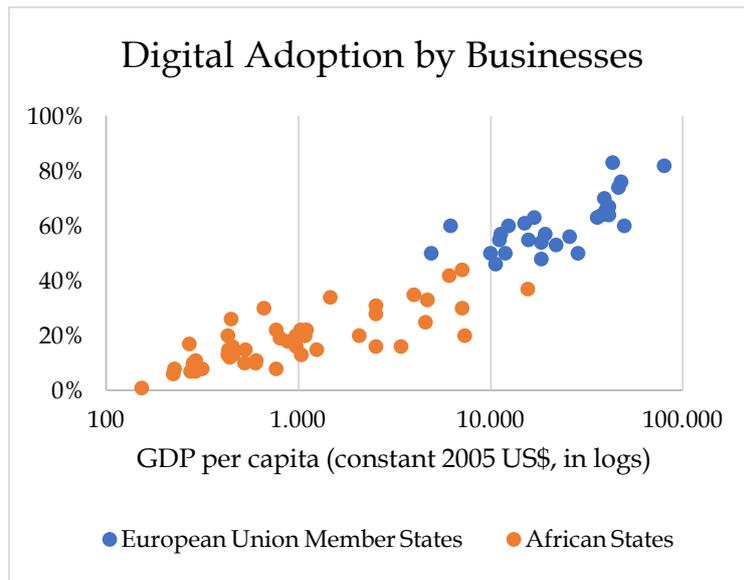
Figures 2, 3 and 4 show the digital adoption by business, by people and by governments according to the GDP per capita of each African country (orange) and each EU Member State (blue). The data regarding GDP per capita and the digital adoption by businesses, people and governments of African countries on the one hand, and from EU Member States was collected from the World Bank data base. These datasets were then visualized by creating a dispersion graph. The GDP per capita was put into logarithmic scale as the data covered a wide range of values and the logarithm reduces them to a more manageable range.

Figure 2. Digital adoption by people in Africa and in the European Union



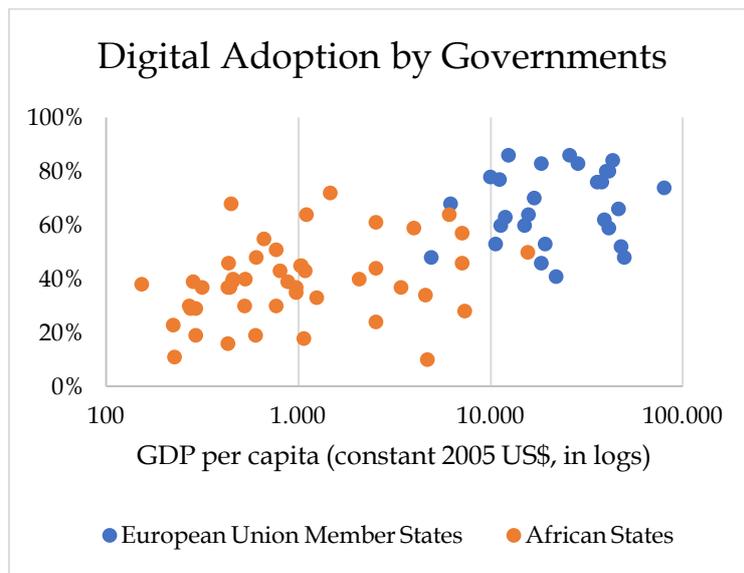
Source: Own elaboration with data from the World Bank

Figure 3. Digital adoption by businesses in Africa and in the European Union



Source: Own elaboration with data from the World Bank

Figure 4. Digital adoption by governments in Africa and in the European Union



Source: Own elaboration with data from the World Bank

As we can see, there seems to be a strong lineal correlation between the GDP per capita of a country and its digital adoption by businesses and people in particular. The correlation remains with regards to digital adoption by governments, but the correlation is not as high. It must be noted however, that since the GDP per capita is in logarithmic scale, the initial relationship of the unaltered variable is exponential.

As well as the strong correlation between both variables, there seems to be a gap between both regions with regards to the digital adoption by businesses, people and governments. This serves as a first analysis that provides a context for the upcoming development policy framework proposed. Indeed, in order to facilitate the convergence of countries, that is, the reduction in the dispersion of levels of income across economies, the European Union should bridge its strengths to the African region, establishing a proper development policy that includes a digital approach.

Digital technologies can be used as an enabler in many fields related to the Sustainable Goals (European Commission, 2017). In gender equality, the enabling power of digital tools and platforms can facilitate advocacy and organization of women's groups. In Climate Change, Environment and Sustainable Energy, long-term and high-quality climate data provides the basis to understand, assess, predict climate variability, and is necessary for the development of climate applications and services to respond to climate change. Digital identification schemes, which include databases with biometric features, can consolidate the link between the identification document and the identity of its holder. These databases make it impossible for an individual to obtain more than one declared identity in a given country. They can also help third country nationals to prove their identity and can help EU Member States' authorities confirm the identity of undocumented irregular migrants. In health, mobile phone-based (mHealth) and eHealth tools have been introduced especially in low- income countries to improve the quality of epidemiological surveillance, health promotion, the management of health services and the training of health workers, all with the aim to strengthen health systems in order to achieve universal health coverage as defined by the UN Agenda 2030 (Delponte, 2015). Digital solutions can also be a powerful tool in capacity building, sustainable agriculture, and education and human development, among others.

However, in spite of the contribution digital technologies can make in these fields that can lead to development, this paper centers its study in three priority areas that are found to be the base that will spur further development in Africa and where the European Union can play a key role. As such, this paper makes the case for 3 priority actions to be implemented into the EU development strategy: 1) To make connectivity more accessible, affordable and secure. 2) To provide digital solutions for growth, job creation and entrepreneurship and 3) To develop digital literacy and digital skills.

6.1 Proposed development policy framework: Priority Areas

6.1.1 Accessible, affordable, and secure connectivity

The main way to promote development through digital solutions is by making connectivity accessible, affordable and secure. Faster computers and cheaper storage are useful in their own right. Nevertheless, the reason that all of these technologies have had such a massive impact on almost all aspects of life is that these devices are linked so that information can be distributed and accessed effortlessly from anywhere (World Bank, 2016). Therefore, three concerns are identified: access, affordability and security.

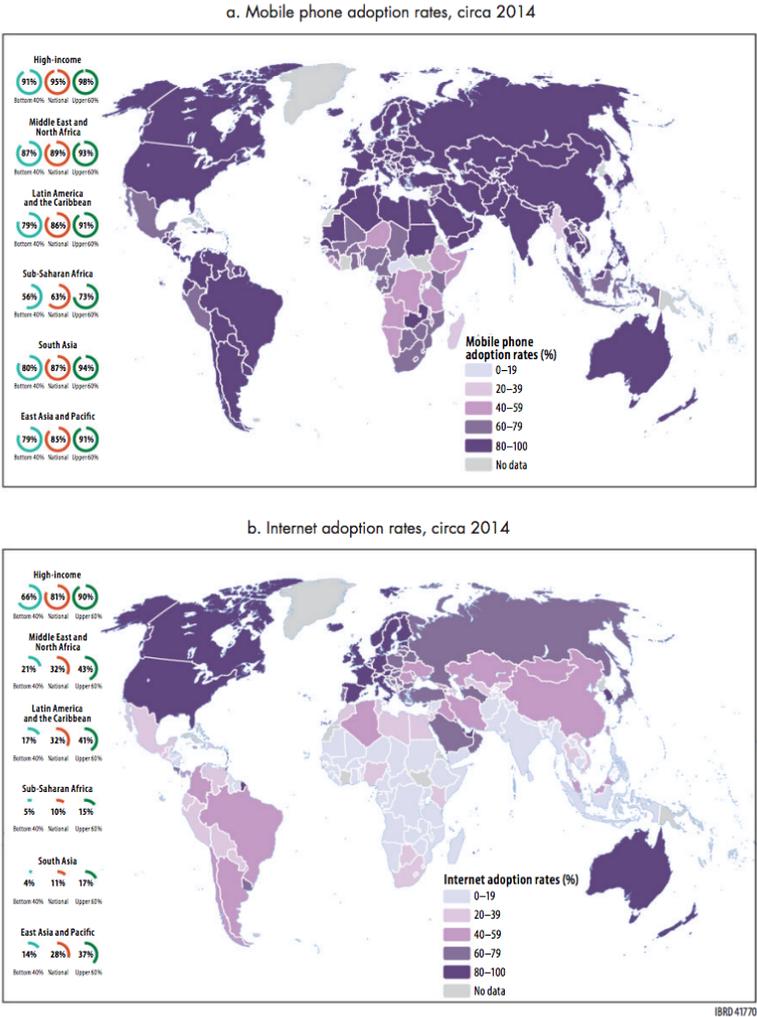
Since the beginning of the millennium, there has been a rapid spread of mobile communications networks all over the world. The internet and related technologies have spread faster in developing countries than previous technological innovations (see Annex 1). While in Kenya it took 60 years to have electricity, mobile phones and the internet has only taken a few years. However, although the internet has reached almost all countries at a fast pace, the intensity of its use has been lower in poorer countries and access to the internet still remains a challenge. Only around 15% of the world's population has affordable access to high-speed internet (see Annex 2). The use of mobile phones is however much larger, accounting to almost three quarters of the total population (World Bank, 2016). As a result, mobile phones are the main form of internet access in developing countries.

Nevertheless, although all regions are converging in mobile phone access, Sub-Saharan Africa is at the tail; and when it comes to internet access, this region is clearly falling behind (see Annex 3). Figure 5 illustrates the mobile phone adoption rates and the internet adoption rates in each country. As we can see, Sub-Saharan Africa has the lowest mobile phone adoption rates, with the national adoption being 63% -and only 56% for the bottom 40% of the population- compared to 95% in the European Union (composed of high income countries). Yet the real gap occurs in internet adoption, where the national adoption of internet access is as low as 10%, compared to 81% in the EU. Clearly, there is a need for the European Union to engage in development cooperation regarding mobile phone adoption, but especially with regards to access to the internet.

Another relevant characteristic is the different adoption rates in the Middle East and North

Africa (MENA) region. The MENA region is particularly relevant for the European Union as it is part of its neighboring countries. As such, it is important to also target development programs towards these countries. From Figure 5, we can see that the MENA region is in fact the second region with the largest mobile phone adoption rates (89%), which is just a little fewer than in the EU (95%). On the other hand, internet adoption rates are at 32%, compared to 81% in the EU. This draws attention to the importance of focusing the development strategies on the promotion of internet adoption.

Figure 5. Mobile phone adoption rates (a) and Internet adoption rates (b) per country



Source: Gallup World Poll, World Bank

The main reason why the African region –in particular Sub Saharan Africa- has the lowest access to connectivity is because of lack of infrastructure (Oyelaran-Oyeyinka, Lal, 2005). While in the OECD countries fixed-line networks came first, forming the backbone of internet access, most developing countries have jumped straight to mobile

networks without investing first in connectivity (see Annex 4). As a consequence, users in developing countries have a second-class internet: slow, expensive, and rarely “always on” (World Bank, 2016). Africa is in fact the region with the highest prices for mobile and fixed broadband services (see Annex 5), making connectivity unaffordable.

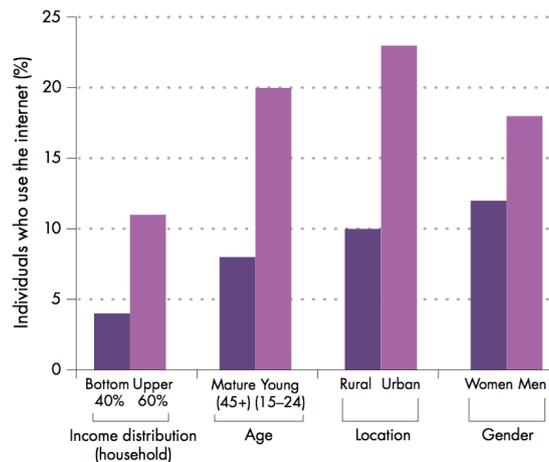
The lack of infrastructure may be due to the “last mile” problem, a term commonly used in communications and transport economics to describe the relatively high cost of building the infrastructure to link to end users, that is, the access network (Hussain, 2015). This problem arises especially in land-locked areas far from the cable landing stations on the coast, and in sea-locked areas, small islands with small populations that cannot justify an investment in undersea cable. Africa is particularly affected by this problem, where geography plays a key role on internet prices (see Annex 6). The coastal average price per Mbit/s in US dollars is 206.61, whereas this figure more than doubles in landlocked countries, its average being 438.82.

Therefore, in order to facilitate affordable access to connectivity, the European Union should support the installation of submarine cables, cross-border fiber connections and Internet Exchange Points (IXPs) (European Commission, 2017). The European Investment Bank (EIB) has supported a number of telecommunication projects in developing countries designed to extend and modernize fixed and mobile telecom networks as well as small size SME-projects investing in the adoption of computer technologies or providing of ICT services. One of its four priorities is infrastructure; in 2017, the EIB provided EUR 18 billion to support infrastructure projects. Africa Mobile Networks, with EIB backing, is installing solar-powered mobile telecom towers across the DRC and Cameroon, potentially connecting 3.6 million people (European Investment Bank, 2017). This will allow even the smallest, most remote communities to access business, health and education services, but the investment and projects in ICT infrastructure should therefore in the upcoming years in order to make connectivity accessible and affordable. The optimum technical solutions (fixed or wireless, satellite, fibre trunking etc.) for any developing country will depend on a balance of factors including geography, population density and economic activity. It is for the regulatory framework to induce operators to opt for the most cost-effective technology and for passing the cost-reduction to the consumer (World Bank, 2016). Generally, where undersea fiber-optic cable is available, it will generally outdo all other solutions in speed, performance, and cost. But for low-density, dispersed populations or remote islands,

satellite offers a quick and easy alternative (World Bank, 2016).

Furthermore, while geography is a critical factor that leads to large digital divides between countries, the digital divide also remains wide within countries, especially regarding internet use. Figure 6 shows how in the African region, the bottom 40% is only one-third as likely to have access to the internet as the upper 60% (World Bank, 2016); 23% of people from urban areas report using the internet versus 10% of people from rural areas, 18% of men versus 12% of women, and 20% of youth versus 8% of those more than 45 years old. Surely, this demonstrates the lack of universal access to connectivity, drawing attention to the large digital divides in Africa and the need to fill that gap with tailored solutions. For example, TV White Spaces⁵ could be looked into as it offers economic solutions for rural communities to extend the reach of Wi-Fi hot spots without expensive mobile infrastructure.

Figure 6. Internet use in Africa by demographic and socioeconomic characteristics, 2011-12



Source: ICT Africa surveys, World Bank

Finally, as the adoption of the internet and different digital technologies take place, a new risk must also be taken into consideration: cybersecurity. The protection of the citizens in terms of data security and privacy are of great importance particularly, but not exclusively, on the Internet. Considering this evolving threat, the European Union has

⁵ While a traditional Wi-Fi router has a relatively limited range, around 100 meters under perfect conditions, and can be blocked by walls or other environmental barriers, TV White Space technology can cover an expanse of about 10 kilometers in diameter (100 times the distance)! This breakthrough technology was nicknamed “Super Wi-Fi” because of its superior range and ability to penetrate obstacles such as trees, buildings and rough terrain. (Carlson Wireless Technologies)

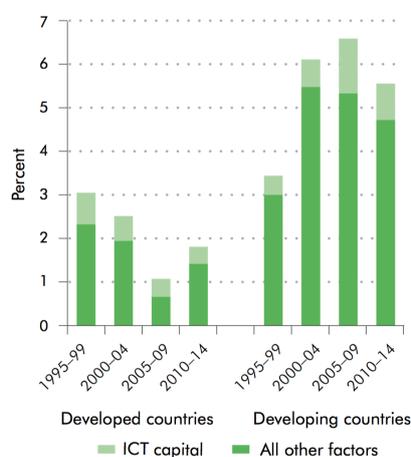
already taken some steps. For example, the European Union’s General Data Protection Regulation (GDPR), which entered into force in early May 2018, is an additional obligation for African companies wishing to maintain their commercial relations with Europe (Signé, Signé, 2018). In these cases, companies that do not comply with the mandated standards are subject not only to proceedings, but also fines, penalties, intellectual theft, and loss of productivity and reputation, among other consequences. Therefore, it encourages the adoption of an adequate regulatory framework that aims to guarantee a certain level of cybersecurity.

Nevertheless, there is still a need for increased consumer education and consumer protection. This is especially relevant in the field of digital finance, as it is bringing large numbers of people into the financial system for the first time (European Commission, 2017). As such, the European Union should not only work towards financial literacy, the prevention of fraud, and dispute resolution mechanisms, but it should pay special attention to data privacy (Signé, Signé, 2018).

6.1.2 Digitalization for growth, job creation and entrepreneurship

Digital technology creates opportunities to accelerate growth. The accumulation of ICT capital accounted for almost 20% of global growth between 1995 and 2014 (see Graph 7). The impact was largest between 2005 and 2009, when it raised aggregate annual growth by 1.3 percentage points a year in developing countries out of a total of 6.6% among these countries. And among high-income countries, it contributed 0.4 percentage points out of 1.2 %.

Figure 7. Contribution to GDP growth, 1995-2014



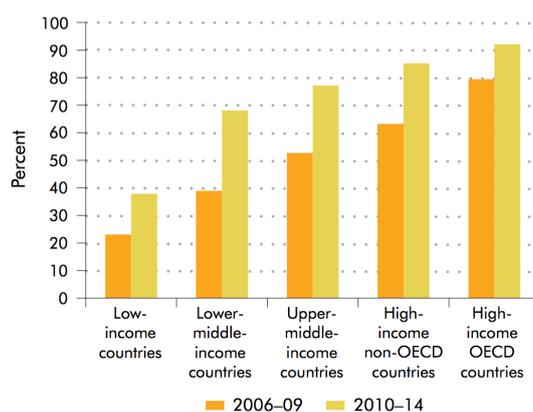
Source: OECD (2014); Conference Board Total Economy Database

Nevertheless, the rapid adoption of digital technologies in the economy has meant that its benefits are widely dispersed and its indirect growth impacts difficult to estimate (World Bank, 2016). Isolating the impact of digital technologies is therefore difficult at an aggregate level; consequently, a more reliable analysis can be made when analyzing the impact at the firm-level.

As seen on the theoretical framework of this paper, the impact of ICTs on economic growth roots from the reduction in information frictions, search costs, and the costs to communicate, which can be seen in terms of inclusion, efficiency and innovation (see Annex 7) (World Bank, 2016). If we apply this framework to firms, digital technologies promote the inclusion of firms in the world economy by enabling more firms to trade new products to new destinations, therefore expanding trade (see Annex 8). It raises efficiency as better information helps companies make better use of existing capacity, optimizes supply chain management and inventory, cuts downtime of capital equipment, and reduces risk, allowing firms in this way to make better use of their capital and labor. Finally, it enhances innovation by enabling firms to exploit scale effects through online platforms and services that compete with conventional business models in retail, banking, or transport to name a few; which leads to higher competition.

The adoption of broadband internet has increased for firms in all country income groups (see Figure 8). The share of firms in lower-middle-income countries using broadband internet rose from 39% in 2006–09 to 68% in 2010–14. In low-income countries, the share in 2010–14 is still fairly low (38%), which hampers gains in productivity.

Figure 8. Share of firms using broadband internet, 2006-14



Source: Hussain (2015) based on World Bank Enterprise Surveys

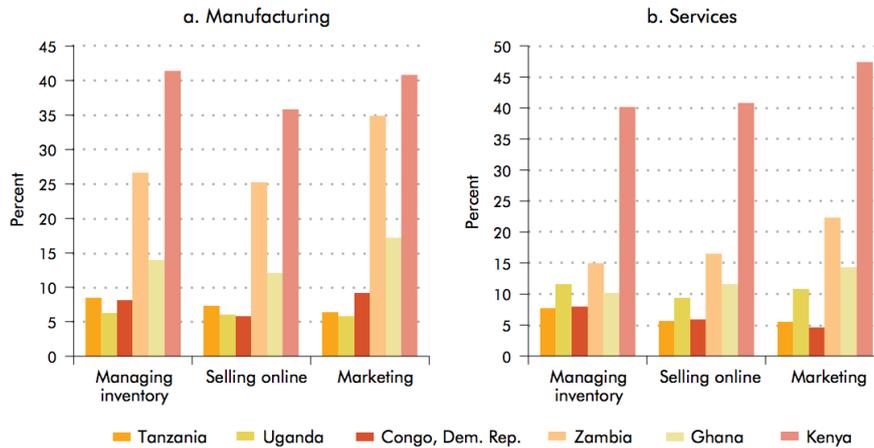
The adoption of the internet is linked to firm productivity. More productive firms are more likely to adopt the internet and use it more intensively (World Bank, 2016). The percentage of firms having a website and selling or buying goods or services online tends to increase with firm productivity in all country income groups (see Annex 9). African firms using the internet have on average 3.7 times higher labor productivity than nonusers and 35% higher total factor productivity (TFP) (See Annex 10). But the most productive firms that do not use the internet have TFPs comparable to high-productivity internet users. The differences are also found to be larger for labor productivity than for TFP, which implies that African firms using the internet are not only more productive but also more capital intensive (Cirera et al, 2015). This enables them to reduce their costs to outperform their competitors.

However, firms in developing countries do not necessarily have the incentive to adopt new technologies to increase their cost effectiveness because they are often protected from domestic or foreign competition. And it is precisely in protected sectors such as retail and wholesale trade, transport, finance or public utilities where digital technology can increase productivity the most. Therefore, developing countries with an institutional environment that safeguards competition and easy market entry will more likely take advantage of the full growth opportunities of digital technologies and catch up faster with high-income countries (Acemoglu et al, 2005). Harnessing those opportunities thus requires policies that lower the barriers to competition and market entry as well as investments in infrastructure and skills. By providing support in these areas, the European Union can ensure that firms use new digital technologies more intensively and effectively, avoiding that African countries fall behind. Surely, the European Union should encourage investment in new digital technologies rather than to let the institutional environment in many countries to allow firms to obtain profits by lobbying for protection.

Also, it must be pointed out that the firm's use of internet varies greatly amongst African countries. Indeed, digital technologies can lead firms and countries to diverge. This divergence in the intensity of internet use for firms in the same sector is confirmed by more detailed survey data from six African countries in 2014 (see Figure 9). Of manufacturing firms in Kenya, 41% used it to manage their inventories, compared with 6% in Uganda. In service firms, management inventory accounts for 40% in Kenya versus

12% in Uganda, and only 7-8% in the Democratic Republic of Congo and Tanzania. In view of these results, the European Union should center its efforts on breaking that digital divide between countries, in order to avoid this divergence.

Figure 9. Firms use of the Internet in six African countries



Source: Ciera, Lage, and Sabetti (2015)

Furthermore, the number of direct jobs created by digital technologies is fairly modest, but the number enabled by it can be large. In developing countries, the ICT sector accounts for only about 1% of the workforce on average (World Bank, 2016). In OECD countries, this sector accounts for about 3–5% of the employment. Nevertheless, ICTs biggest contribution to job creation is found in other sectors. The digital economy is providing new opportunities for entrepreneurship and self-employment at a very rapid pace. The internet’s ability to reduce transaction costs increases opportunities for people who face barriers in finding jobs or productive inputs. In fact, highest impact of the internet for workers and consumers has been in connecting people to work and markets, which has contributed significantly to worker productivity (see Annex 11). As consequence, women, people from remote areas and people with disabilities receive the benefits of digital technologies.

The European Commission has already acknowledged the importance of digital technologies in growth, job creation and entrepreneurship in Europe. Studies have shown that SMEs in Europe, grow two to three times faster, creating new jobs, when they embrace novel digital technologies (European Commission, 2014). As result, the Digital Single Market (DSM) for Europe strategy was adopted in May 2015 (European

Commission, 2015). Consequently, there is great scope for further translating the key principles of the DSM to a wider EU development policy by promoting digital economies in the African region.

Furthermore, in order to develop local ecosystems that can support start-ups to grow, the European Union should interconnect the main actors of start-ups ecosystems. The recent development of tech hubs across Africa (see Annex 12) exemplifies how technology clusters create a snowball effect as initial preconditions for success generate additional, mutually reinforcing innovation drivers (World Bank, 2016). Although not comparable in scale to Silicon Valley, technology clusters in Africa nevertheless demonstrate that close collaboration between the private sector, government, and academia, can help develop a vibrant ecosystem that facilitates ongoing innovation and market entry (World Bank, 2016).

Reinforcing cooperation between the EU and African partner countries on mutual beneficial terms can help build bridges between both of the start-ups ecosystems. As a result, this could lead to joint projects, better access to venture capital, more financing opportunities, and an improvement in creativity and talent. This could be further eased by a pilot project supporting digital entrepreneurs, including incubators, accelerators and other types of ecosystem builders fostering digital innovation in a number of African countries. Boost Africa, a joint initiative between the African Development Bank (AfDB) and the European Investment Bank (EIB) aims to boost the entrepreneurial power of Africa's young people by providing financial capital and developing human capital, helping in this way entrepreneurs to effectively deal with the many obstacles that arise when building new enterprises. Initiatives like this should be scaled up and brought to many countries from the African region.

6.1.3 Digital literacy and digital skills

It is unlikely that citizens benefit from the use of digital technologies if their low literacy does not allow them to participate productively in life; in Mali and Uganda, about three-quarters of third-graders cannot read (World Bank, 2014). Aside from basic literacy, ICT skills are also lacking. In Africa, 7 in 10 people who do not use the internet say they just don't know how to use it, and almost 4 in 10 say they do not know what the internet is

(Isaacs, 2007). Surely, a relevant education is more important today than ever, because today's networked world demands a workforce that understands how to use technology as a tool to increase productivity and creativity (Hawkins, 2002).

The use of ICT skills may vary among countries, sectors and businesses, yet what it is for certain is that the importance of these skills is growing. On average, one-third of urban workers (and 20% of the bottom 40 in urban areas) in developing countries use a computer at work, for example (see Annex 13). These figures are likely to increase rapidly as economies grow and employment becomes more intensive in the use of technologies (see Annex 14). In fact, according to The World Bank's STEP Skills Measurement Program (STEP), the share of working-age individuals in urban areas who report that lack of ICT skills is a barrier to employment and higher earnings is significant in many developing countries (see Annex 15); in Kenya, this figure amounts to 18%, and probably increases in other countries where there lacks information. However, it must be noted that there are no comprehensible global statistics on digital literacy and skills to understand the phenomenon in detail as its finds challenges in scope, measurability and definition; making the collection of data regarding digital literacy rate very challenging. Nevertheless, major studies and surveys regarding internet use in developing countries identify digital literacy as one of the main concerns to be addressed.

Therefore, investments in infrastructure and related policies are likely to go in vain if there is no effort on the development of human resources, new and appropriate curricula, and the close involvement of universities which can draw on their international networks. Indeed, digital literacy and digital skills are key enablers to build strong digital economies and mitigate inequalities.

Nonetheless, skill development is a cumulative process: it is hard to develop technical and high-order cognitive skills without basic literacy or a strong foundation of socioemotional skills (World Bank, 2016). Similarly, foundational and more complex cognitive and socioemotional skills built early in life and throughout general education are the base for the building and updating of technical skills in postsecondary education and training (World Bank, 2016). Therefore, the priority on Africa should be put on building foundational cognitive and socioemotional skills and ensure basic ITC literacy.

The European Union should therefore consider five uses of technology that are promising in building foundational skills according to the World Bank: connecting teachers to content; making learning more personalized through adaptive curricula and assessments; reinforcing content learned in school; fostering collaboration and increasing students' engagement; and promoting adult literacy (World Bank, 2016). The work that can be done in this field is limitless and necessary. For example, Bridge International Academies is an initiative composed of the largest chain of preprimary and primary schools in the world, with more than 110,000 students in Kenya and Uganda. It uses technology and data analysis to standardize and scale education delivery; on top of it, it is an alternative way to make basic education more affordable. The average family of a student in the Bridge Academy lives on US\$1.60 a day per person.

Surely, primary school up to tertiary education is particularly important for ensuring a digital literacy that corresponds to the needs of the digital age. To that end, mainstreaming digital literacy and skills into the "Human development" priority and the Erasmus+ program can also have a significant impact (Council of the European Union, European Parliament, 2013).

Lastly, the European Investment Bank (EIB) has "innovation and skills" as one of its four priority areas. As such, it should include support for education related to ICTs, from computer literacy to technical training; teacher training; distance learning; network-based centers of excellence; strengthening the potential of universities, developing interactivity with educational and research networks cross-regions.

7. CONCLUSION

In conclusion, through the collection, management and visualization of data obtained from the World Bank, a strong correlation between GDP per capita and digital adoption can be observed. Digital adoption by governments is the least- yet still considerably- correlated with GDP per capita. What's more, the digital adoption rates imply that businesses, governments and people are more connected than never before. Nonetheless, African countries are lagging behind whereas the EU is at the head. Consequently, in order to facilitate the convergence of countries, that is, the reduction in the dispersion of levels of income across economies, the EU should bridge its strengths to the African region, establishing a proper development policy that includes a digital approach.

Although digital technologies have been found to be an enabler in the fields of gender equality, environment sustainability, digital identification, health, and education, to name a few, this paper has centered its study in three priority areas that are considered to be the base for promoting development in Africa and where the EU can play a key role. As such, this paper has made the case for 3 priority actions to be implemented into the EU development strategy: 1) To make connectivity more accessible, affordable and secure. 2) To provide digital solutions for growth, job creation and entrepreneurship and 3) To develop digital literacy and digital skills.

First, the main way to promote development through digital solutions is by making connectivity accessible, affordable and secure. The reason that all of these technologies have had such a massive impact on almost all aspects of life is that these devices are linked so that information can be distributed and accessed effortlessly from anywhere. Nevertheless, although all regions are converging in mobile phone access, Sub-Saharan Africa is at the end; and when it comes to internet access, this region is clearly falling behind. Clearly, there is a need for the EU to engage in development cooperation regarding mobile phone adoption, but especially with regards to access to the internet. The MENA region however, a relevant region as it borders the EU, has almost caught up with the EU in mobile phone adoption rates (89% versus 95% respectively). On the other hand, internet adoption rates are at 32%, compared to 81% in the EU. This draws attention to the importance of focusing the development strategies on the promotion of internet adoption.

Furthermore, connectivity is often unaffordable. The main reason why the African region –in particular Sub Saharan Africa- has the lowest access to connectivity may be because of the lack of infrastructure, which may be due to the last mile problem that affects landlocked and sealoaked areas especially. Therefore, the EU, through the European Investment Bank (EIB), should support the installation of submarine cables, cross- border fiber connections and Internet Exchange Points (IXPs), as infrastructure is one of the EIB's priority areas.

Lastly, as the adoption of the internet and different digital technologies take place, a new risk must also be taken into consideration: cybersecurity. The European Union's General Data Protection Regulation (GDPR), which entered into force in early May 2018, is a first step to making African firms comply with standards, but States should implement an adequate regulatory framework to make connectivity secure.

Secondly, digitalization is important for growth, job creation and entrepreneurship. Digital technology creates opportunities to accelerate growth; the accumulation of ICT capital accounted for almost 20% of global growth between 1995 and 2014 (OECD, 2014). As was seen in the theoretical framework of this paper, the impact of ICTs on economic growth roots from the reduction in information frictions, search costs, and the costs to communicate, which can be seen in terms of inclusion, efficiency and innovation; at the same time, these lead to an increase in international trade, capital utilization and competition (Cirera et al, 2015). Nevertheless, an institutional environment that safeguards competition and easy market entry is needed to take advantage of the full growth opportunities of digital technologies (Acemoglu et al, 2005). The digital divide between African countries also reinforces the need for the EU to establish tailored strategies.

In addition, the number of direct jobs created by digital technologies is fairly modest, but the number enabled by it can be large (World Bank, 2016). In fact, the highest impact of the internet for workers and consumers has been in connecting people to work and markets, which has contributed significantly to worker productivity (World Bank, 2016). As consequence, women, people from remote areas and people with disabilities can receive the benefits of digital technologies.

The EU has already acknowledged the importance of digital technologies in growth, job creation and entrepreneurship in Europe with the creation of the Digital Single Market for Europe strategy. Consequently, there is great scope for further translating the key principles of the DSM to a wider EU development policy by promoting digital economies in the African region.

Reinforcing cooperation between the EU and African partner countries on mutual beneficial terms can also help build bridges between both of the start-ups ecosystems. This could lead to joint projects, more financing opportunities, and an improvement in creativity and talent. The EU could conduct a pilot project supporting digital entrepreneurs, including incubators and accelerators. Initiatives like *Boost Africa*, a joint initiative between the African Development Bank (AfDB) and the European Investment Bank (EIB), should be scaled up and brought to many countries from the African region.

Third and last, helping develop digital literacy and digital skills is a key component to make sure that all African citizens reap the benefits of digital technologies. In Africa, 7 in 10 people who do not use the internet say they just don't know how to use it, and almost 4 in 10 say they do not know what the internet is (Isaacs, 2007). According to the World Bank's STEP Skills Measurement Program (STEP), the share of working-age individuals in urban areas who report that lack of ICT skills is a barrier to employment and higher earnings is significant in many developing countries (World Bank, 2016). However, it should be pointed out that there are no comprehensible global statistics on digital literacy and skills to understand the phenomenon in detail, as its finds challenges in scope, measurability and definition (World Bank, 2016). Still, many surveys and studies draw attention to the importance of building digital skills and digital literacy; the EU should put its priority on building foundational cognitive and socioemotional skills and ensure basic ITC literacy especially at early age stages. To that end, mainstreaming digital literacy and skills into the "Human development" priority and the Erasmus+ program can also have a significant impact (Council of the European Union, European Parliament, 2013). Lastly, the European Investment Bank (EIB) has "innovation and skills" as one of its four priority areas. As such, it should include support for education related to ICTs.

All in all, digital technologies are playing a key role in development as they contribute to

greater inclusion, increase efficiency, and enhance innovation. Africa however, is not realizing the broader development benefits from using technologies. For this reason, and in view of the impact digital technologies can have in development, the European Union should further mainstream a digital approach to its development policy towards the region.

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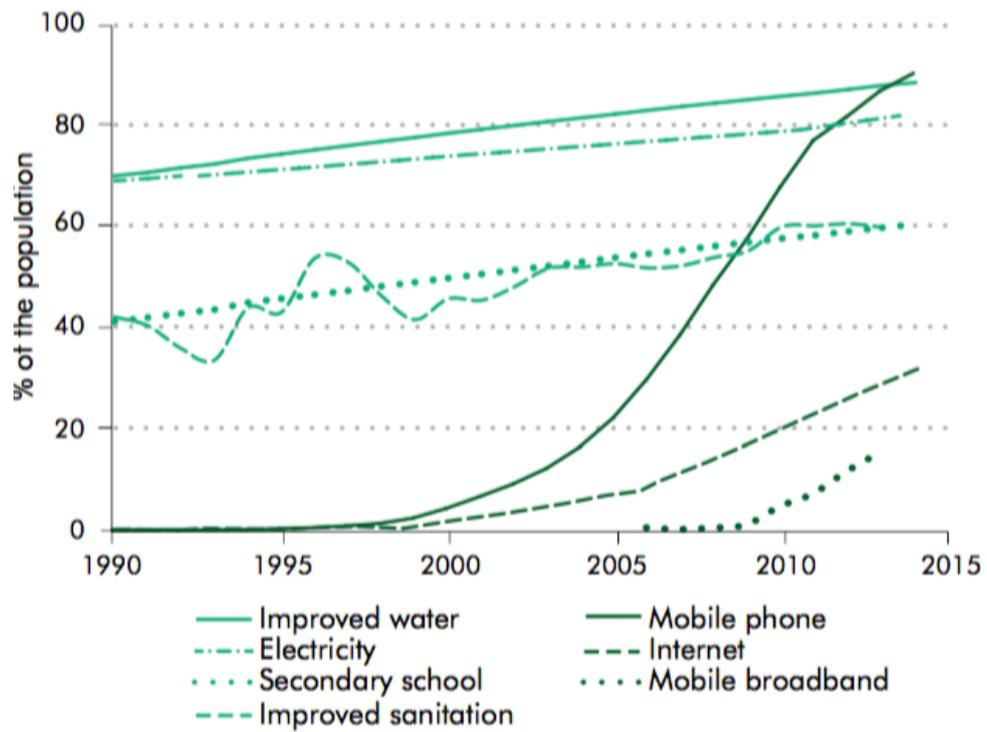
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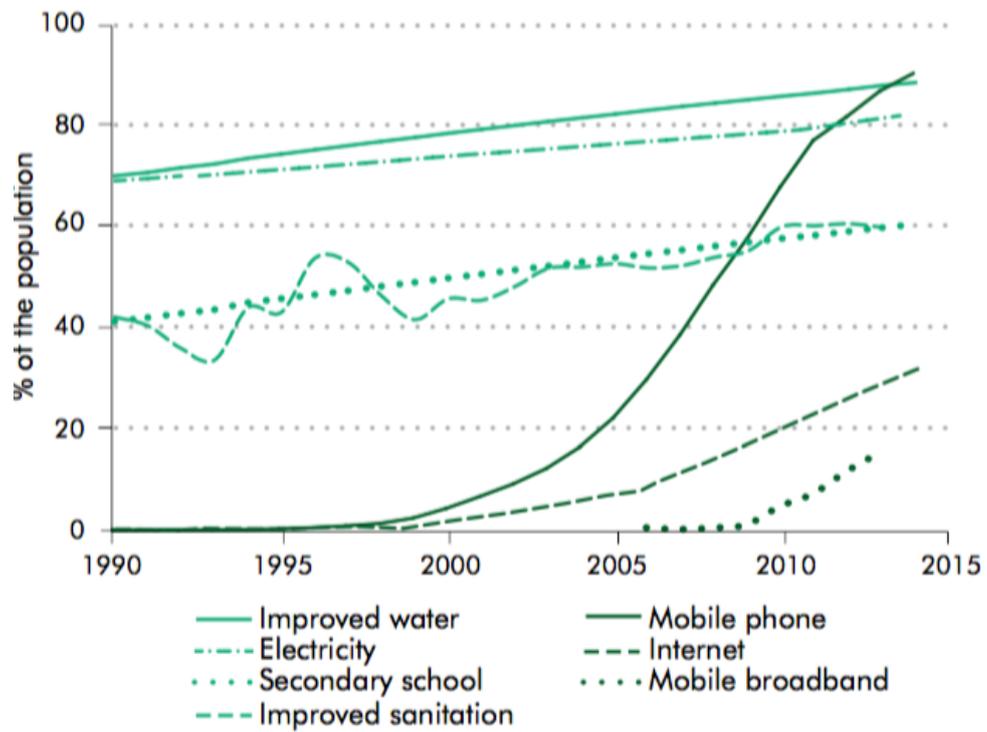
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ANNEX 1. THE SPREAD OF DIFFERENT DIGITAL TECHNOLOGIES IN DEVELOPING COUNTRIES



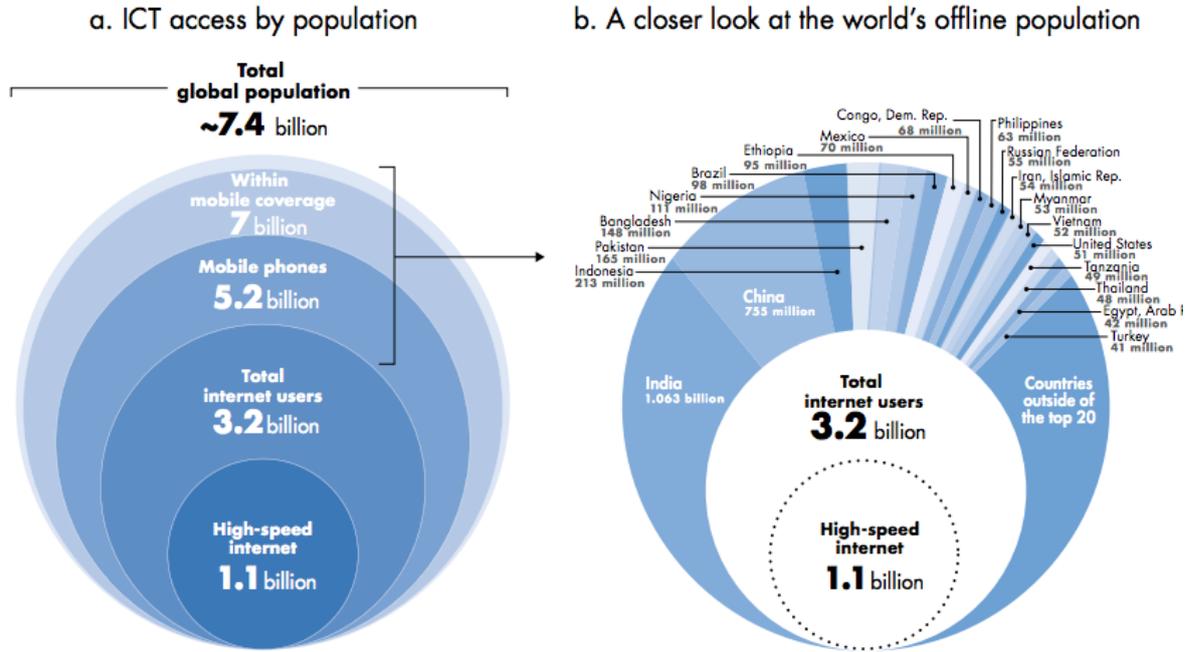
Source: World Development Indicators (World Bank, various years)

ANNEX 1. THE SPREAD OF DIFFERENT DIGITAL TECHNOLOGIES IN DEVELOPING COUNTRIES



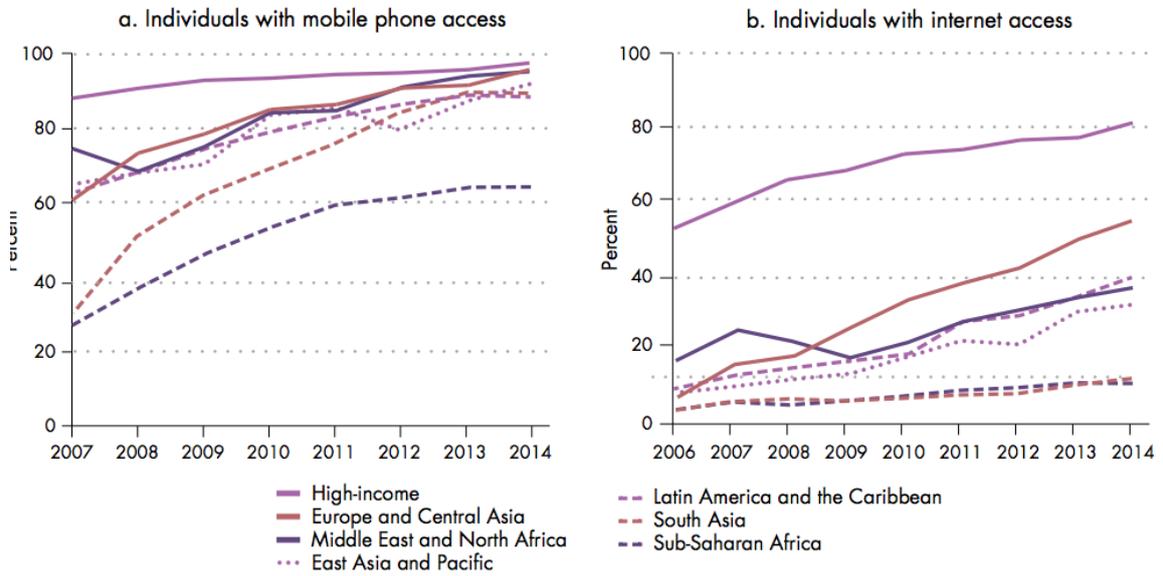
Source: World Development Indicators (World Bank, various years)

ANNEX 2. GLOBAL ICT ACCESS BY POPULATION (a) AND THE WORLD'S OFFLINE POPULATION (b)



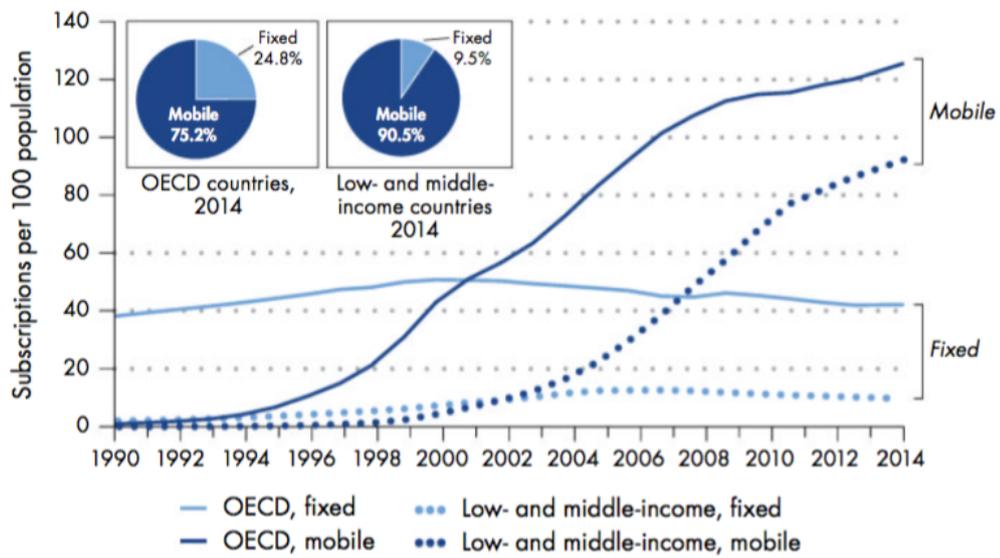
Source: World Bank 2015; Meeker 2015; ITU 2015

**ANNEX 3. INDIVIDUALS WITH MOBILE PHONE (a)
AND INTERNET ACCESS (b)**



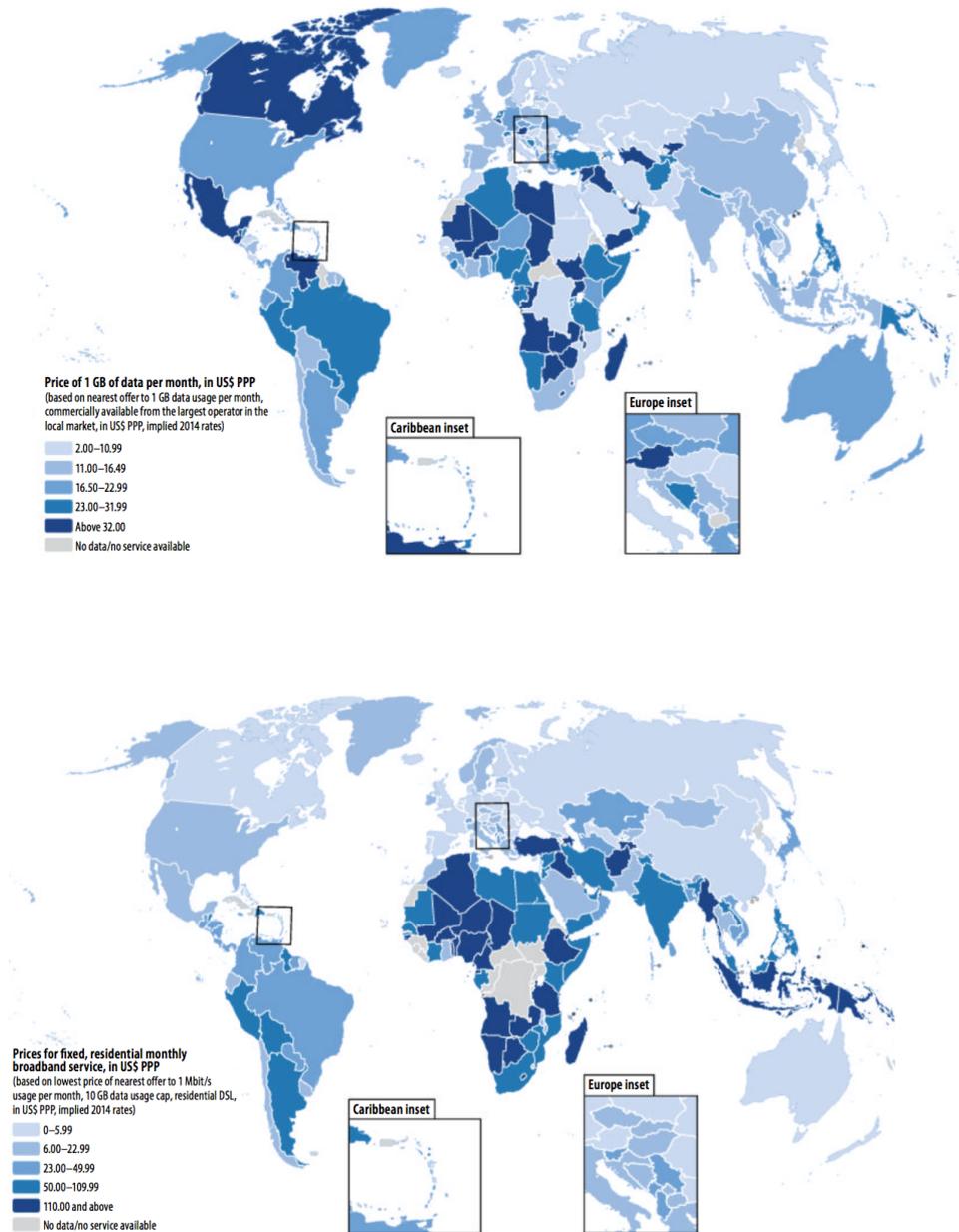
Source: World Bank, based on Gallup World Poll, various years

ANNEX 4. NETWORK BUILDOUT (SUBSCRIPTIONS PER 100 POPULATION) IN OECD AND LOW- MIDDLE INCOME COUNTRIES, 1990-2014



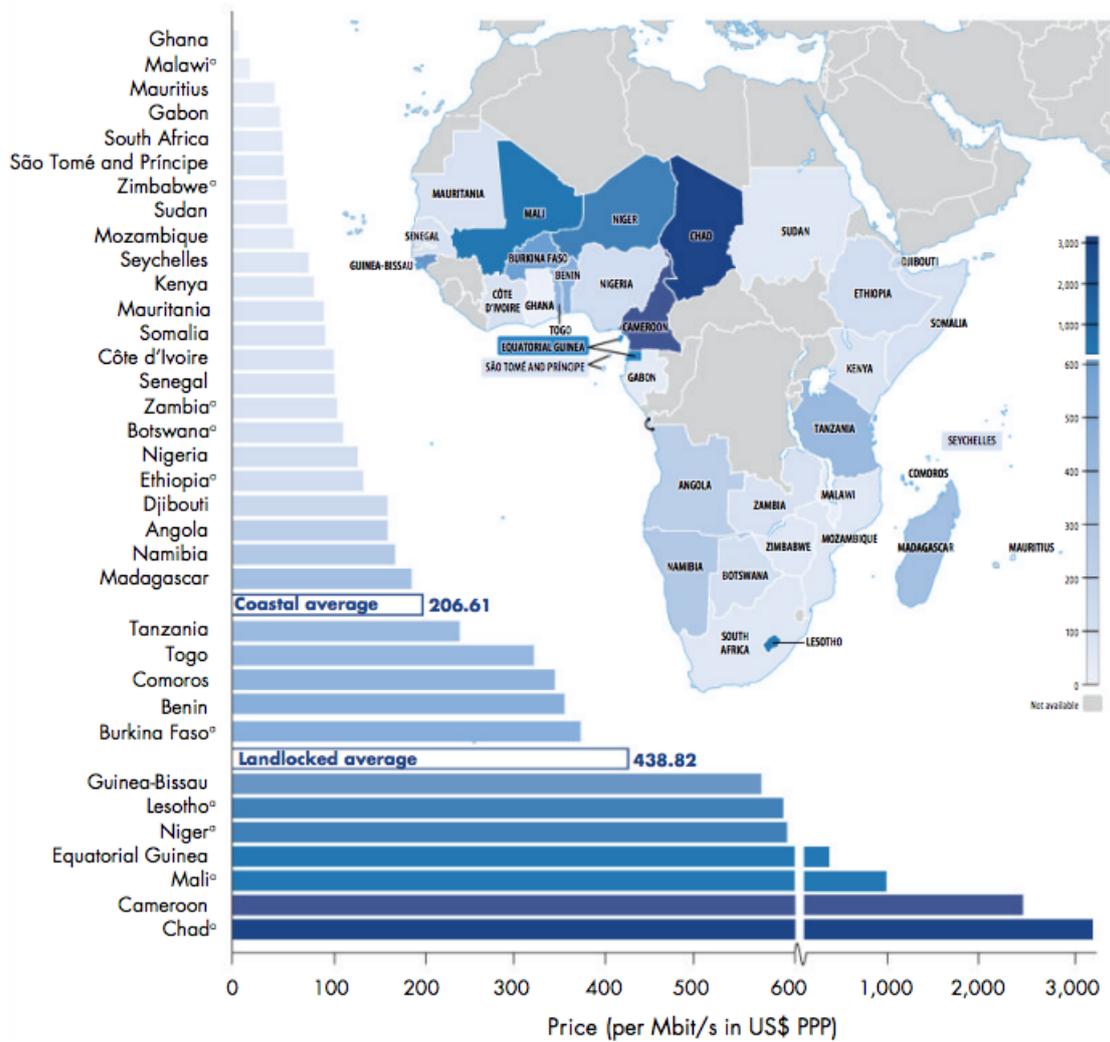
Source: Adapted from ITU World Telecommunication/ICT Indicators database

ANNEX 5. PRICE OF MOBILE AND FIXED BROADBAND SERVICES



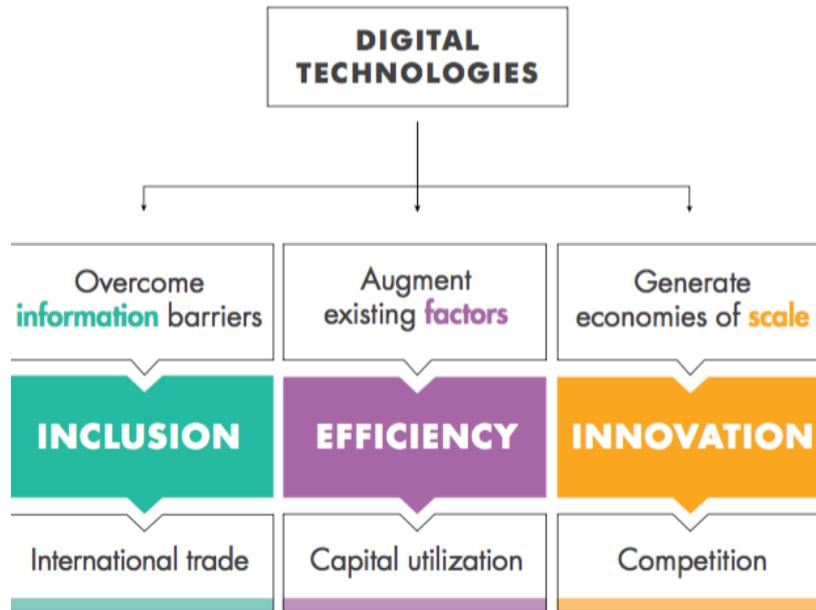
Sources: World Bank with additional data from Oxford Internet Institute, Google

ANNEX 6. THE EFFECT OF GEOGRAPHY ON INTERNET PRICES IN AFRICA



Source: World Bank, WDR 2016 Team

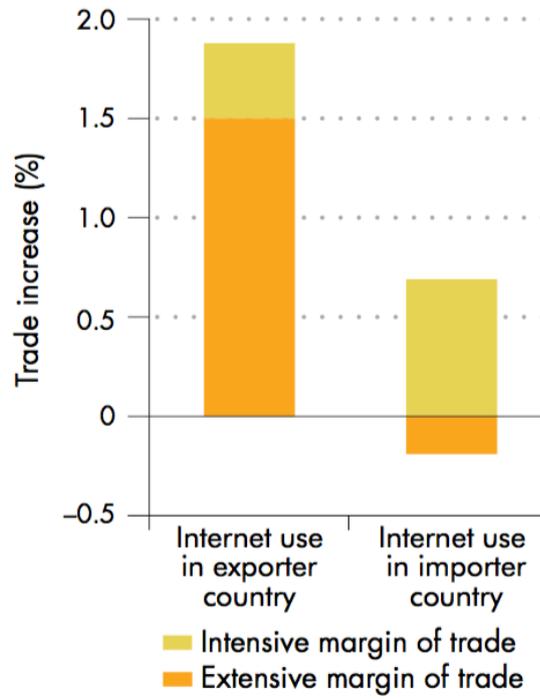
**ANNEX 7. A FRAMEWORK FOR THE INTERNET
AND ECONOMIC GROWTH**



RISK: DIVERGENCE AND MONOPOLY POWER

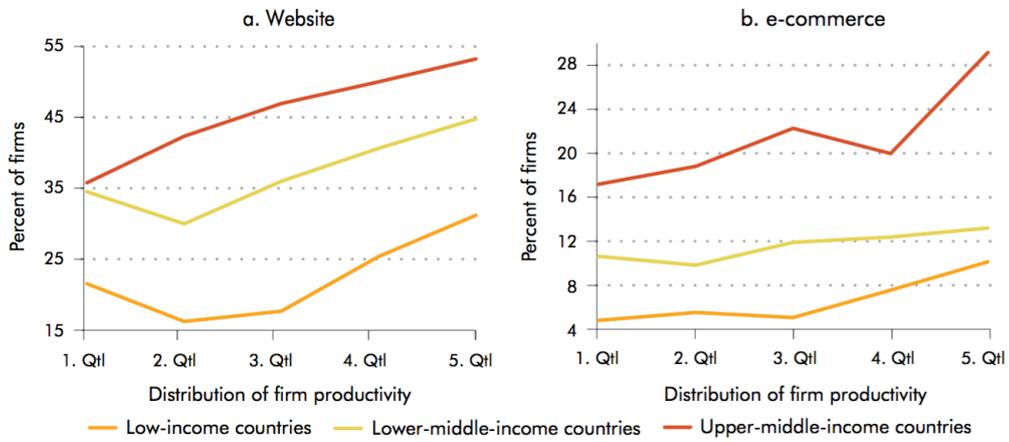
Source: World Bank, WDR 2016 Team

ANNEX 8. TRADE INCREASE ACCORDING TO INTERNET USE IN EXPORTER COUNTRY AND IN IMPORTER COUNTRY



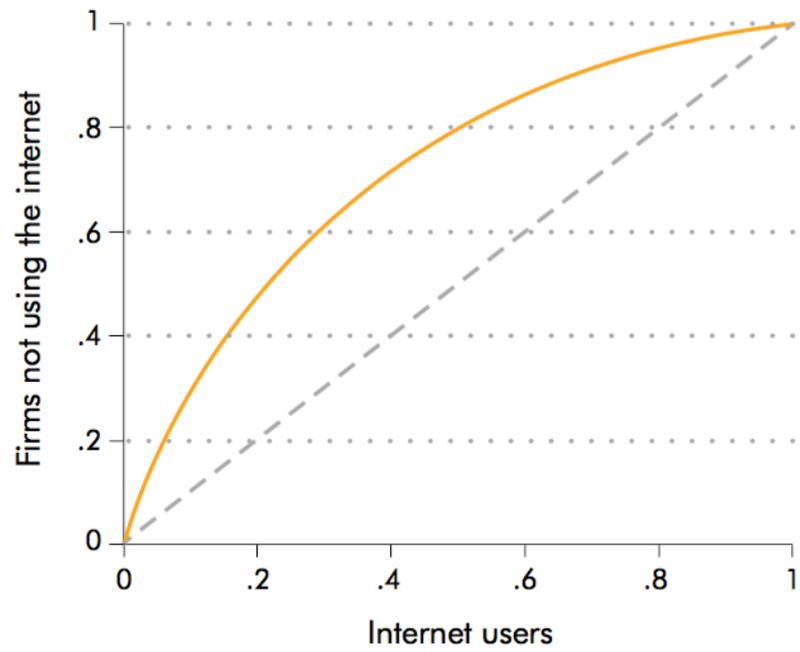
Source: Osnago and Tan, 2015

**ANNEX 9. DISTRIBUTION OF FIRM PRODUCTIVITY ACCORDING
TO USE OF WEBSITE AND E-COMMERCE**



Source: Hussain (2015) based on World Bank Enterprise Surveys, various years

ANNEX 10. DISTRIBUTION OF SALES PER WORKER



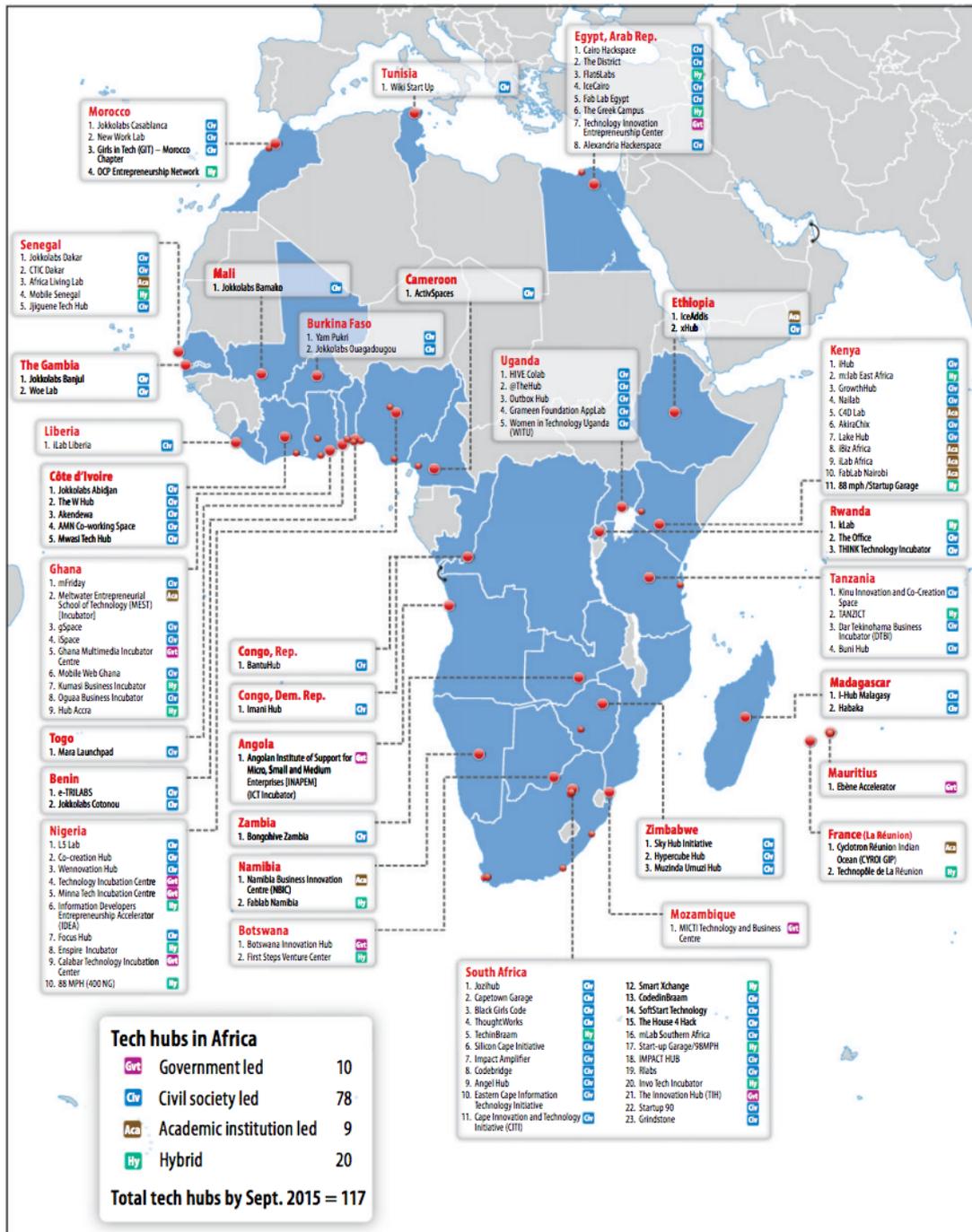
Source: Cirera, Lage, and Sabetti (2015)

ANNEX 11. BENEFITS OF DIGITAL TECHNOLOGIES FOR WORKERS AND CONSUMERS

Channel	Impact so far		Potential impact	
	Poor	Nonpoor	Poor	Nonpoor
<i>Creating jobs</i>				
In the ICT sector and occupations	Negligible	L	Negligible	L
In sectors that use ICT	L	M	L	M
<i>Increasing worker productivity</i>				
Increasing returns to human capital	L	M	L	H
Connecting people to work and markets	M	H	H	H
<i>Benefiting consumers</i>				
Increasing consumer surplus	M	H	H	H

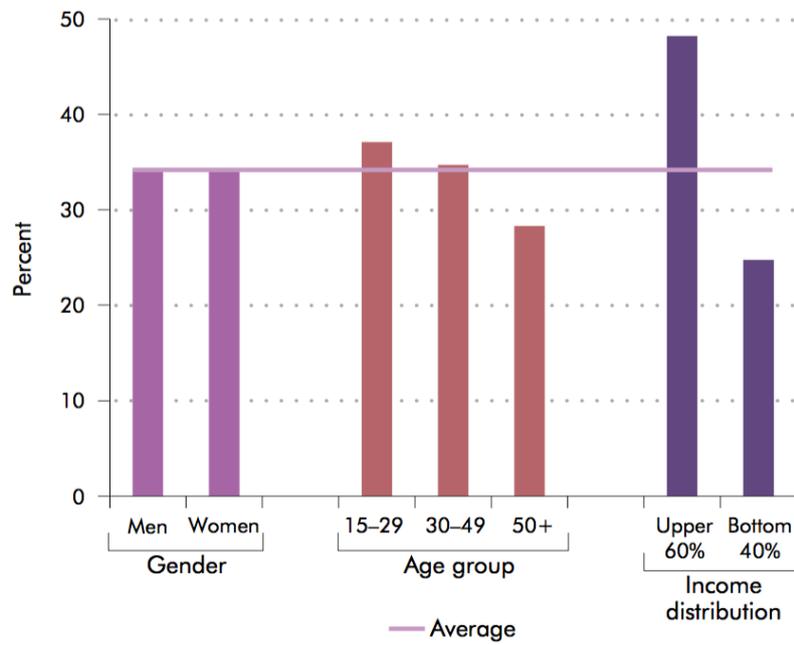
Source: World Bank, WDR 2016 team

ANNEX 12. TECH HUBS IN AFRICA LED BY CIVIL, PRIVATE AND ACADEMIC AGENTS



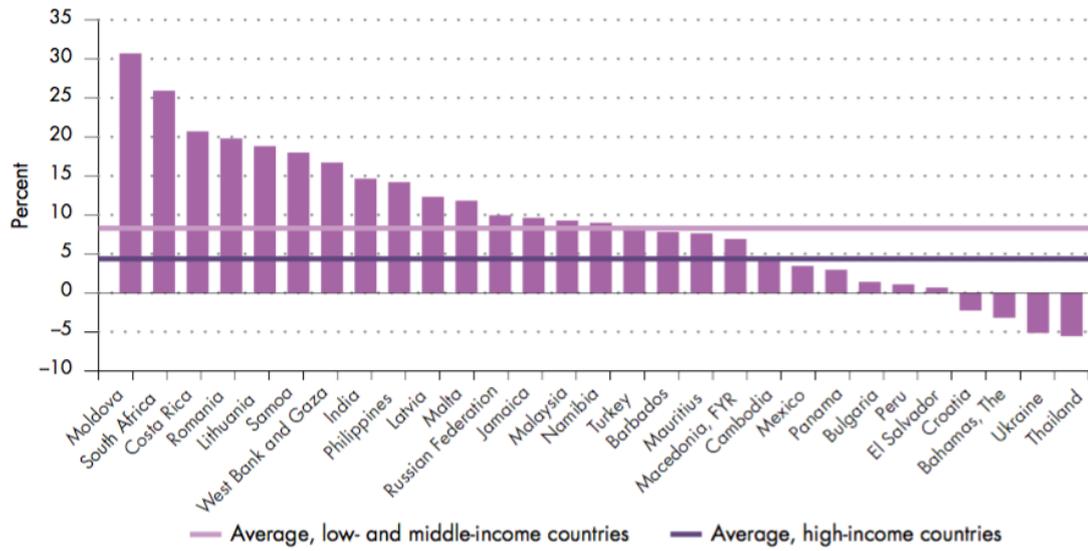
Source: World Bank, WDR 2016 Team

**ANNEX 13. URBAN WORKERS WHO USE A COMPUTER AT WORK,
CONDITIONAL ON WORKING**



Source: STEP household surveys, World Bank

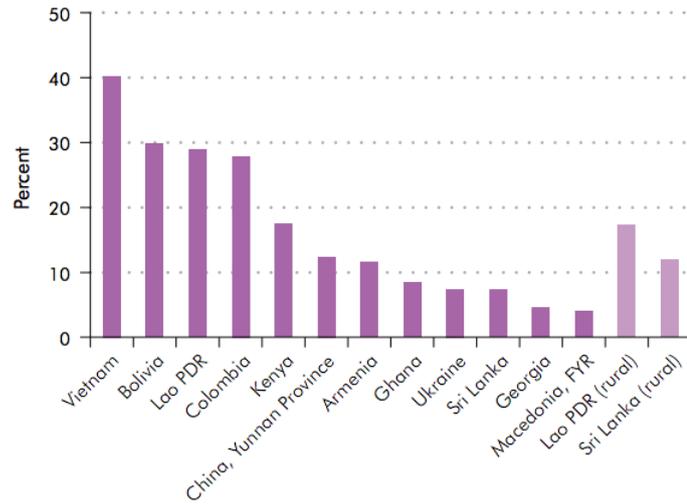
ANNEX 14. CHANGE IN ICT INTENSITY OF EMPLOYMENT, 2000-12



Source: Monroy- Taborda, Moreno and Santos (2015)

ANNEX 15. SHARE OF WORKING-AGE INDIVIDUALS IN URBAN AREAS WHO REPORT THAT LACK OF ICT SKILLS IS A BARRIER TO EMPLOYMENT AND HIGHER EARNINGS

Share of working-age individuals in urban areas who report that lack of ICT skills is a barrier to employment and higher earnings, circa 2013



Source: STEP household surveys (World Bank, various years)