

Development Implications of Digital Economies

Paper No. 6

Digital Economy Policy in Developing Countries

RUMANA BUKHT & RICHARD HEEKS

2018



Developed as part of DIODE: the “Development Implications of Digital Economies” strategic research network, funded by the UK’s Economic and Social Research Council as part of the Global Challenges Research Fund initiative

Published by: ***Centre for Development Informatics***
Global Development Institute, SEED
University of Manchester, Arthur Lewis Building, Manchester, M13 9PL, UK
Email: cdi@manchester.ac.uk Web: <http://www.cdi.manchester.ac.uk>

View/Download from: <https://diode.network/publications/>

Table of Contents

ABSTRACT	1
1. THE DIGITAL ECONOMY OPPORTUNITY	2
2. DIGITAL ECONOMY CHALLENGES AND THE NEED FOR POLICY.....	3
2.1 DIGITAL INFRASTRUCTURE CHALLENGES	3
<i>Technical Infrastructure Challenges.....</i>	<i>4</i>
<i>Cost</i>	<i>5</i>
<i>Hardware/Software Challenges.....</i>	<i>5</i>
<i>Digital Content</i>	<i>6</i>
2.2 DIGITAL ECONOMY ECOSYSTEM: HUMAN AND INSTITUTIONAL INFRASTRUCTURE CHALLENGES	7
<i>Digital Capability Barriers</i>	<i>7</i>
<i>Weak Financial Institutions.....</i>	<i>8</i>
<i>Challenging Governance and Business Ecosystems</i>	<i>9</i>
2.3 DIGITAL ECONOMY DISBENEFITS.....	10
<i>Digital Exclusion</i>	<i>10</i>
<i>Digital Inequality and Adverse Incorporation</i>	<i>11</i>
<i>Other Digital Harms</i>	<i>12</i>
3. OVERVIEW OF DIGITAL ECONOMY POLICY.....	13
3.1 DIGITAL INFRASTRUCTURE POLICY.....	13
3.2 DIGITAL ECONOMY ECOSYSTEMS POLICY	14
3.3 DIGITAL ECONOMY DISBENEFITS POLICY	16
3.4 GOVERNANCE OF DIGITAL ECONOMY POLICY	18
<i>Discussion.....</i>	<i>19</i>
REFERENCES.....	23

Digital Economy Policy in Developing Countries

Rumana Bukht & Richard Heeks

Centre for Development Informatics, University of Manchester, UK

2018

Abstract

The digital economy – that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services – is of increasing importance to developing countries. Yet digital economy reality is undershooting its potential in these countries, due to a series of challenges. Digital infrastructure is in part incomplete, costly and poorly-performing. The wider digital ecosystem suffers a shortfall in human capabilities, weak financing, and poor governance. Growth in the digital economy is exacerbating digital exclusion, inequality, adverse incorporation and other digital harms. Alongside explaining these challenges, this paper overviews the policy objectives and measures, and processes and structures necessary to enhance digital economy growth and its contribution to socio-economic development.

1. The Digital Economy Opportunity

Digital technologies are spreading throughout the world at a faster pace than previous waves of technological innovation, and are re-shaping business models and sectors (Dahlman et al. 2016). This transformation includes emergence of the digital economy. Defined as “that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services”, the digital economy is estimated to make up around 5% of global GDP and 3% of global employment (Bukht & Heeks 2017).

The digital economy has enabled fast revenue growth for many firms; encouraged the shift from tangible flows of physical goods to intangible flows of data and information; enabled firms in developing economies to connect across borders; and has thus facilitated a surge in cross-border data flows. Digital economy firms have disrupted incumbents across a wide range of sectors, with platform-centred business models that have proven highly successful (see Figure 1; Manyika et al. 2016a). Disruptions have occurred in information search and sharing (e.g. Google, Facebook, Twitter, Pinterest), personal services (e.g. Uber, Airbnb), entertainment online (e.g. Netflix, YouTube, iTunes), and shopping (e.g. Amazon, eBay, Alibaba) among many others. Various labour market platforms have emerged that have enabled clients to find services, and workers to find jobs across different countries (e.g. Monster, LinkedIn) or to engage in gig work (e.g. Upwork, Samasource, Freelancer, TaskRabbit).

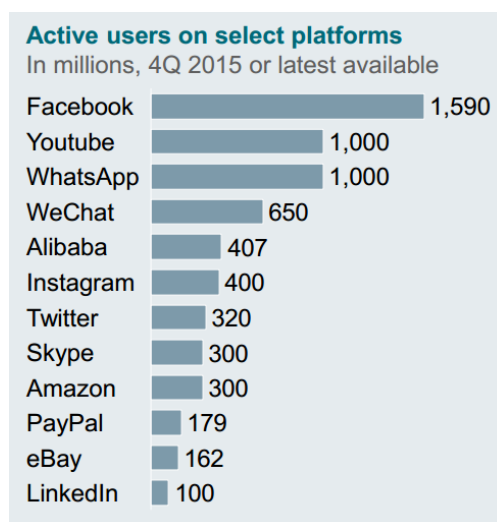


Figure 1: Active users on digital platforms

The visibility of this promise and opportunity has encouraged many developing countries to hold high aspirations for the future role of their digital economies in delivering economic growth and other development goals. Yet – as discussed in greater detail in the sections that follow – this potential is constrained by a number of challenges. The digital economy of course relies heavily on the state of a country’s – and its trading partners’ – digital infrastructure; but these are often lagging behind global standards in developing countries. The digital economy ecosystem requires an infrastructure well beyond just the technical. This includes a strong stock of human capital, and a set of diverse and capable institutions.

Once again, though, developing countries find themselves well behind the curve on these other elements of infrastructure.

Institutional infrastructure will include digital economy policy but both content and governance of such policy is typically lacking in countries of the global South (Marcus et al. 2015). This includes policy to deal with the final set of challenges – more socio-political in nature – such as the digital exclusion that exists between and within countries (Dahlman et al. 2016); fuelling inequality by preventing individuals, groups, regions, etc from participating in the digital economy (OECD 2015). This also encompasses the disbenefits that emerge from engagement with the digital economy: inequalities deriving from being adversely incorporated into such economies; and other digital harms such as those relating to breaches of security and privacy.

Given the centrality of policy in addressing these digital economy challenges, there is an urgent need for developing country policy-makers to take action. But what policy response is required? This paper seeks to provide an answer. Section 2 reviews some of the policy challenges in more detail, while Section 3 summarises some of the policy prescriptions that will need to be followed.

2. Digital Economy Challenges and the Need for Policy

According to the World Bank (2016, p.x), a whole set of challenges are “preventing the digital revolution from fulfilling its transformative potential” in developing countries; including the potential outlined for digital economies. These create the backdrop of problems to which policy solutions are required; and they will here be categorised in terms of digital infrastructural challenges, digital ecosystem challenges (human, institutional) and digital economy disbenefits.

2.1 Digital Infrastructure Challenges

Digital infrastructure has not been able to keep pace with the fast-growing demand for digital services and there is a severe lack of infrastructure for digital access and connectivity in many developing economies. For example, infrastructural weaknesses are identified as a major barrier to digital entrepreneurship in the global South (Quinones et al. 2015; see also Damarillo 2011), and as a major differentiator of digital economies in developed and developing economies. These must be overcome in order for the promise of digital economies to be fully realised and to avoid the current situation of what Wentrup et al. (2016) call “black holes of information capitalism”. This becomes all the more imperative due to other trends; for example, the growing urbanisation of developing country populations (it is anticipated that by 2030 urban populations will have grown to around five billion people (Marcus et al. 2015)); and the increasing data-intensity of economic processes alongside the affordances of cloud computing and the Internet of Things (Greengard 2010, Hilbert 2016).

We can understand this in terms of the model shown in Figure 2 (adapted from Heeks 2018a).

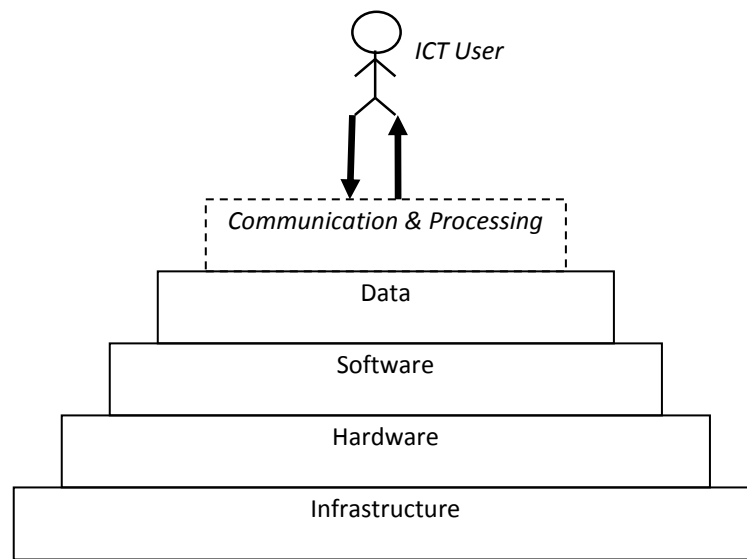


Figure 2: Foundations of digital infrastructure

Technical Infrastructure Challenges

Lack of cost-effective, available, and reliable electricity is a major obstacle to digital economy development (Kuek et al. 2015). Without electricity, of course, there can be no digital economy. For example, Nigeria's energy production meets only 10% of its daily power requirements with only 40% of Nigerians connected to the national grid (GSMA 2011). Where this infrastructure is present, it still acts as a constraint. For example, in many developing countries, the unreliable and fluctuating local power supplies hinder the ability to connect to local data centres and lead to data loss (Greengard 2010). Mobile phone companies have to install their own power supply using diesel generators to keep base stations/mobile towers operational. The operation of these generators – two are typically needed per cell tower – comes at a significant cost to the industry (GSMA 2011).

In terms of telecommunications infrastructure, while there has been tremendous progress in closing the digital divide when it comes to basic (2G) mobile cellular signal availability (e.g. in rural areas), there is still a considerable gap between developed and developing countries in terms of 3G and 4G cellular coverage (ITU 2014a). In many – especially rural – areas of developing countries, 4G and even 3G are still inaccessible (Okeleke & Stryjak 2015). The shift to higher network connectivity is costly to implement for operators that have little incentive to expand network coverage in areas with low population densities, electrical supply issues, fragile security situations and thus limited return on investment (Manyika et al. 2016b). More generally, there are quality and capacity issues for telecommunications infrastructure reflected in dropped calls, delays in text messaging, weak signals, and network overload (World Bank 2013).

As discussion of the importance of 3G and 4G indicates, Internet access is a critical underpinning to digital economy development but faces two major issues: building network capacity and expanding network reach (Marcus et al. 2015). For example, it is predicted

that the global Sustainable Development Goal target of providing affordable Internet to the Least Developed Countries by 2020 is unlikely to be achieved; instead, being predicted for 2042 at the earliest (Alliance for Affordable Internet 2015; Alliance for Affordable Internet 2017). Instead, by 2020, only 53% of the world and only 16% of the world's poorest will have access to the Internet. These overall figures also hide serious national differences. For example, some African countries such as the Seychelles and South Africa have over 50% Internet penetration, while for others such as Niger, Chad and the Democratic Republic of the Congo the figure is less than 4% (Wentrup et al. 2016). The same picture pertains for broadband more specifically: it is broadband access that is especially required for those wishing to participate in the digital economy, and its absence prevents them from so doing (Kuek et al. 2015).

Cost

As well as issues of availability and accessibility, affordability is also an important challenge. In developing countries, for instance, the average monthly fixed broadband prices are three times higher than in developed countries, and mobile broadband prices are twice as expensive (ITU 2015). But in terms relative to local incomes, bandwidth costs in low-income economies can be up to 100 times higher than those in the global North (WTO 2013). Such problems are exacerbated by tariff and tax policies that have seen ICT-related items as a reliable source of government income, leading to higher costs than in the industrialised world (Meltzer 2014). Given the basic laws of supply and demand, higher costs lead to lower diffusion of ICT infrastructure and devices, with evidence of usage being restricted e.g. in Ghana (Taylor 2015). This not only hampers the general spread of the digital economy via individual users but specifically causes problems for digital enterprises (eBay 2013).

Hardware/Software Challenges

Even where infrastructural challenges can be overcome, users must have the appropriate devices and applications with which to engage with or build local digital economies. Yet this is often not the case. Many mobile devices, for example, are still only compatible with 2G network functionality, which provides little more than basic voice and text messaging services (Okeleke & Stryjak 2015). Access to mobile Internet and to digital economy services requires 3G- and 4G-compatible devices; in particular, it requires widespread diffusion of smartphones. Yet, for example, only three per cent of the Indian population was found to have access to a smartphone (Johns 2015). This figure is growing all the time but it once again presents a serious barrier to particular regions and groups, particularly given that the majority of global content is focused on data-intensive websites or smartphone apps (Okeleke & Stryjak 2015).

Affordability is again an issue. Smartphones are quite outside the reach of poorer populations. Even a simple mobile phone costing just US\$20 may lie outside the disposable-income reach of those earning less than US\$1.25 per day, as hundreds of millions of the world's population do (World Bank 2016). Figure 3 (Strategy& 2012) gives further insights into the costs of extending digital infrastructure to the poorest of the world's population.

Cost in \$ per Capita, Annually

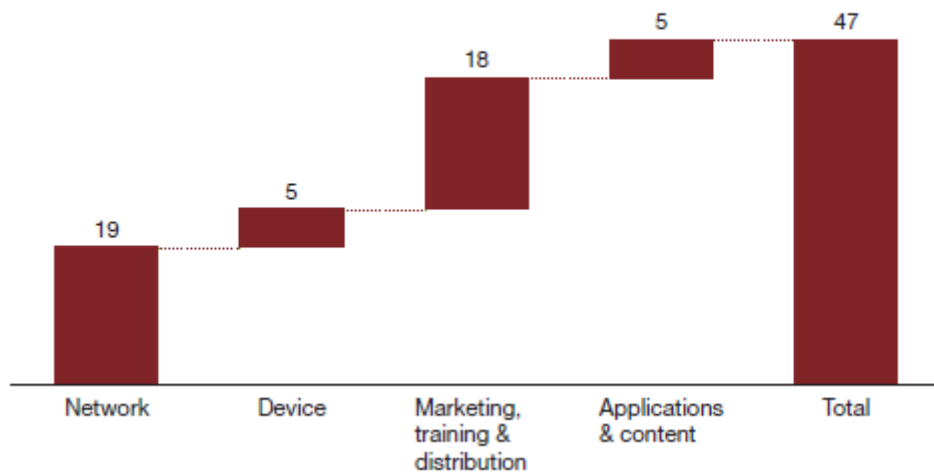


Figure 3: Costs of digitising the base-of-the-pyramid

Digital Content

Language is a barrier. For example, Asia Pacific is lagging behind in the use of ICTs not only because of the unavailability of affordable hardware and connectivity, but also because much digital content is still primarily in non-Asian languages (Hussain & Mohan 2008). The skew can be seen overall in Figure 4 (InternetWorldStats 2017): of the world's approximately 6,000 languages (UNESCO 2015), the top ten reflect 77% of users.

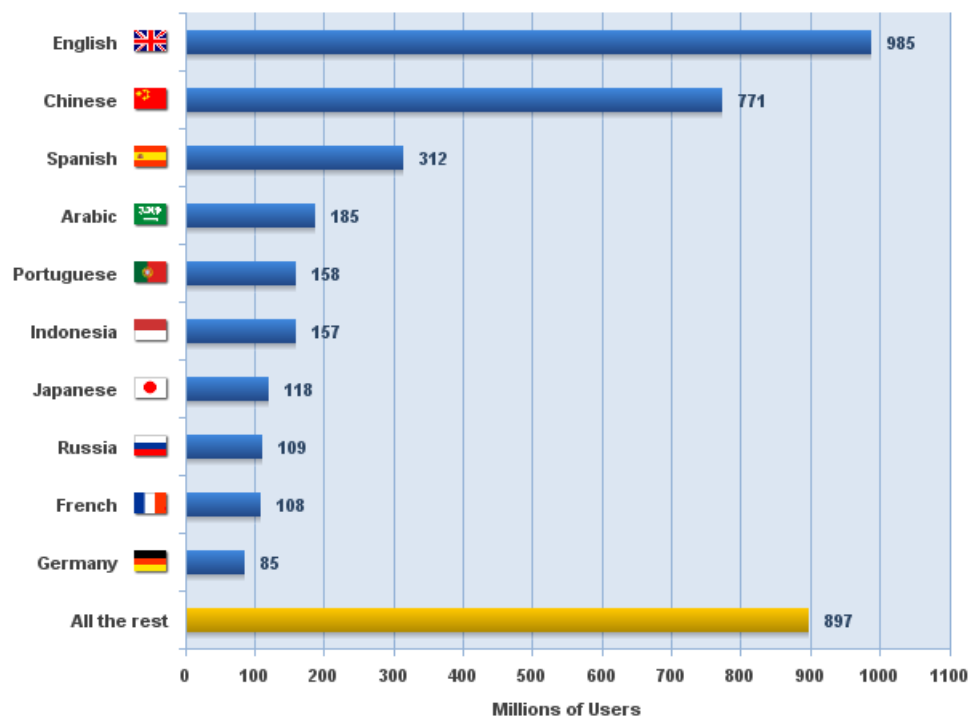


Figure 4: Top 10 languages in the Internet in millions of users

Taking more specific examples, in sub-Saharan Africa, only 2.8% of the web pages that are aimed at the African population use indigenous African languages (Nyirenda-Jere and Biru 2015). Much of the content is in English or French, yet these are spoken by less than 10% of the population even in the countries where they may be the official languages (Hussain and Mohan 2008). In Nigeria, though the official language is English, there are more than 500 indigenous languages, including Hausa, Yoruba, Igbo, Fulani, that are also spoken but not available online in any significant mass (Nottebohm et al. 2012). Even China reflects the issue: 17% of the world's population is Chinese and yet only 3% of the world's websites are written in Chinese (Okeleke & Stryjak 2015).

English is still the primary language of the Internet. Policies are needed to encourage content developers to consider content for non-English speakers but, beyond language, the lack of availability of relevant digital content and services discourages individuals from going online and from fully participating in the digital economy (Dutta et al. 2015; UNESCO 2015).

2.2 Digital Economy Ecosystem: Human and Institutional Infrastructure Challenges

Digital Capability Barriers

On the digital economy demand side, in order for people to become active users, they would need to have three layers of literacy: (i) *basic literacy* – so they can use the technology and platforms; (ii) *English literacy* – because so much online content is in English; (iii) *digital literacy* – which will allow them to use devices as well as develop an understanding and awareness of the Internet's value for their daily lives (Marcus et al. 2015). In many developing economies these capabilities are often absent (Alyoubi 2015): at the most basic level, for example, over 1 billion people in developing countries cannot read or write (Marcus et al. 2015), and lack of ICT skills are a key factor explaining slow adoption of the Internet (*ibid.*) and slow uptake of digital technology more generally (KPMG 2017).

The same approach can also be applied to the supply side; i.e. to those who work in the digital economy, with a model as summarised in Figure 5 (Nyirenda-Jere and Biru 2015).

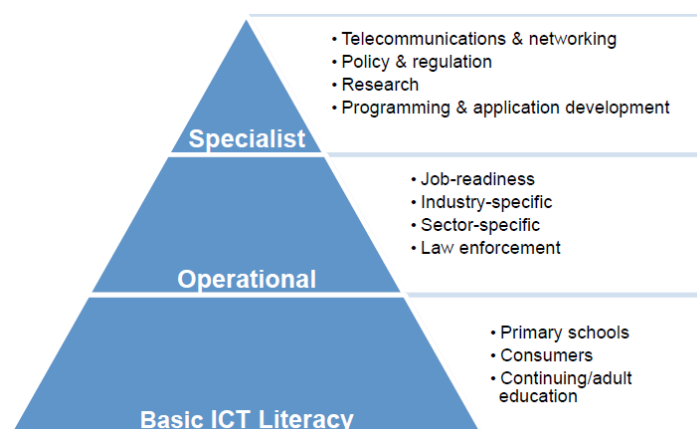


Figure 5: ICT capability development levels

The shift to the digital economy demands new digital skills for future employment and economic prosperity. Yet such skills are lacking. Thus, despite high unemployment rates, many highly skilled positions in developing economies are difficult to fill because of the lack of specialist, technical skills (Chang 2015; European Commission 2015; House of Commons: Science and Technology Select Committee 2016). This is hampered further by out-migration of skilled IT professionals seeking better pay and work opportunities overseas (Mutula and van Brakel 2007). Business and policy leaders have encouraged at least some investment in the diffusion of digital technologies, but they have neglected to invest equivalently in a labour force for the future (Knickrehm et al. 2016). Thus, while many developing countries' national ICT policies and strategies mention capacity building as a priority, there is a lag in most countries when it comes to actually implementing this strategy and in terms of the type of skills that are the focus (Nyirenda-Jere and Biru 2015).

Any review of digital economy activity can identify areas where skills are, and will be needed. In Africa, there is an acute shortage of ICT skills in developing and managing distributed data networks which is hindering digital trade (Yonazi et al. 2012). Robotics and machine learning could be either a threat or opportunity for developing country jobs; but one thing is certain – best use will not be made of them unless appropriate and complementary human skills are developed (Schwab 2016). Big data and data analytics are a vital part of all economic sectors in the global South but there is a significant shortage of data skills in developing countries (ITU 2014a). Cybercrime is growing hand-in-hand with expansion of the digital economy, yet cybersecurity professionals are thin on the ground in the developing world (NISC 2013).

Weak Financial Institutions

Lack of financial capital for businesses is a major issue for the growth of the digital economy in developing countries. Various types of capital are required by companies depending on their stage of business development. For companies that are starting out, lack of *seed funding* can be a critical bottleneck as capital is required to build a product prototype to test the commercial and technological feasibility of the business idea (AlphaBeta 2017). *Growth funding* is needed for companies that want to scale their business. However, venture capital financing activities have been evolving on only a limited scale in developing economies. Most developing countries lack domestic venture capital and foreign investors are usually wary of investing in small, unproven business models (Nottebohm et al. 2012), with only a small (but growing) number of foreign venture capital firms pioneering the effort (Meng and Li 2002).

Those most affected by this lack of funding are small and medium enterprises (SMEs). Large companies typically have the required capital, global networks, and economies of scale to enter and compete in local and global markets (ADB 2015). But small businesses in developing countries are often squeezed out as they lack access to capital and are therefore unable to pay the large upfront costs associated with exporting (*ibid.*).

There is also a particular challenge in securing finance for capital-heavy infrastructure such as broadband networks, or international connectivity that requires large up-front investment which the private sector is often unable to take on (Yonazi et al. 2012). One result is that many developing economies lack the high-speed Internet backbones and international bandwidth capacity that are critical for digital economy growth (ITU/UNESCO 2011). One problem is that funding for such investment must compete with funding for

what are sometimes argued to be more pressing development needs (WTO 2013). Developing countries are also burdened with high levels of debt and long pay-back periods due to weak or insufficient “nascent demand conditions” in these markets (Fong 2009).

Challenging Governance and Business Ecosystems

In direct terms, financial problems relate to lack of availability of capital but that availability in turn may be restricted by problems in the wider governance and business ecosystem.

Policies, for example, are often outdated: unable to accommodate the emerging trends of new technologies and services offered through the digital economy (Van Welsum 2016). New platforms have disrupted traditional models but are often assisted because they lack the regulation that governs those traditional models: avoiding health and safety regulations, or avoiding tax which was providing much-needed revenue via the traditional businesses (Zervas et al. 2015; House of Commons 2016). The same is true of tax more broadly: international tax laws designed in the pre-digital age are not appropriate to capture a fair level of taxation from the digital economy (European Commission 2013). Likewise more generally for legislation around digital labour, with existing laws not able to keep pace with changes in the gig economy (Heeks 2017).

Rather than being outdated, appropriate policies may simply be absent. For example, an estimated 73% of economies in the Asia-Pacific region have adopted e-transaction laws, however, only 38% have adopted laws on consumer protection and 29% on privacy (UNCTAD 2015). Similarly, cybercrime laws are in place in only 56% of developing economies as against the 90+% adoption rate in developed economies (ADB 2015).

Where policy is present and even up-to-date, there are still debates on whether or not it is the right type of policy to help the digital economy develop. This often comes down to a matter of perspective. For example, those with a more neo-liberal focus would tend to argue for more “business-friendly” policies that impose less regulation and lower taxes on digital businesses (Dahlman et al. 2016). But there tends to be general agreement over some other aspects of policy; for example that poor intellectual property protection hinders digital economy investment (Cowhey and Kleeman 2013). For example, one evaluation on the political and regulatory environment of countries around the world – based on factors such as: the efficacy of law-making bodies, ICT-related laws, and the speed and process of enforcing contracts – found that two-thirds of African countries were in the bottom quartile (GSMA 2011). This hampers investment given ICT firms’ investment decisions are found to be shaped by transparency and quality of the regulatory regime (*ibid.*).¹

Wider institutional forces also play a role here, and relate not to content of policy so much as its governance, and even the governance of the wider business ecosystem. Examples found likely to restrict digital economy growth include high levels of corruption², undue influence of elite groups on the government and other public institutions, and autocratic and ineffective management cultures in key institutions (Meng and Li 2002; Lazovic and Kovacevic 2010; Schwab 2016). This notion of wider institutional barriers can spread even further. For example, some developing country governments have restricted access to the

¹ A specific example cited is inefficiency and ineffectiveness in distribution of universal service funds, with one survey claiming 74% of funds were not distributed (GSMA 2011).

² For example in Kenya, companies had to pay bribes in order to expedite landline connections or otherwise wait 100 days to obtain landline service (Aker and Mbiti 2011, p.212).

Internet due to concerns that it badly affects some religious, cultural (Lazovic and Tamara 2014) or political beliefs (as in China, North Korea and Thailand) (Lui 2017). Language barriers – discussed earlier – are a further examples of an institutional challenge facing digital economy growth in developing countries.

Governance and business ecosystem challenges are especially seen to constrain the growth of digital trade. The “borderless” and thus multi-jurisdictional nature of that trade, and its relatively invisibility, make issues of claims, contract enforcement and litigation unclear (World Bank 2016). This is exacerbated by the lack of international bodies with explicit responsibility and/or explicit guidance in relation to digital trade (Lund and Manyika 2016), and the related absence of cost-effective and timely dispute settlement systems, financial payment mechanisms, and consumer and data protection laws (Meltzer 2016).

2.3 Digital Economy Disbenefits

The challenges listed above are constraints that hold digital economies in the global South back from developing to their full potential. But, alongside these problems are others which emerge as digital economies develop.

Digital Exclusion

The digital divide looms large over the digital economy in developing countries. Those on the wrong side of the divide are excluded from the possibility of engaging with or in the digital economy. While this is a constraint to digital economy development, it may also be seen as a disbenefit inherent to that development. The divide is more properly understood as a series of divides: “differences in resources and capabilities to access and effectively utilize ICT for development that exist within and between countries, regions, sectors and socio-economic groups” (UNDAW 2005, p.2). There is a divide of availability (e.g. for those living outside the footprint of mobile signal coverage), a divide of affordability (e.g. for those who have insufficient money to afford a smartphone), and a divide of applicability (e.g. for those who lack the capabilities to use particular apps or to undertake particular types of digital work) (Heeks 2018a).

While originally and still to some extent thought of as division between countries, digital divides are today more often understood as existing within countries. Specifically, there are intersectional exclusions: those that arise due to multiple dimensions of inequality within countries, and which may cause some to endure aggregated exclusion. Of these dimensions, those relating to gender (which themselves in large part derive from institutional forces) are perhaps best known. For example, it is estimated that poor urban women are 50% less likely to be connected to the Internet than men despite similar levels of education and household income (World Wide Web Foundation 2015). Chang (2015) similarly reports more general data that women are 23% less likely than men to have access to the Internet, while Dutta et al. (2015) note generally that fewer women and girls than men and boys have access to mobile phones and the Internet. Another key dimension of exclusion is income. For example, micro- and small businesses lack the funds to be able to fully engage with the digital economy: in India, 68% of such businesses are fully offline and only 2% actively promote themselves online (KPMG 2017). Finally (though income is a strong part of this and also education), those in rural areas are far more likely to be

excluded from digital economies than those in urban areas (ITU 2014a). Of those – roughly half the planet’s population – who are not connected to the Internet, there is thus disproportionate representation from the world’s female, poor, and rural citizens (Alliance for Affordable Internet 2017).

Digital Inequality and Adverse Incorporation

As the section above indicates, there are still many “have nots” blocked from the benefits of engagement with developing countries’ digital economies. But far more now fall into a “have less” category; having some level of incorporation into the digital economy but on adverse terms such that they benefit less than others, and thus such that digitally-related inequalities are reproduced or strengthened. For example, gender disparities are replicated on digital labour platforms, with women in Asia earning around 20% less than men with equivalent skills (Dubey et al. 2017). Similarly, workers based in the global North are 30% more likely to be hired than a counterpart in the global South, and will also be paid more due to the “liability of foreignness” (Lehdonvirta et al. 2014, p.6).

This reflects a more general reinforcement of inequalities as the digital economy has progressed; now particularly seen in the platform economy which, as noted above, has so far kept relatively free of the regulatory constraints that “civilise” the traditional economy. The pattern has been a strong asymmetry of power between labour and capital; to the significant disadvantage of labour. One result has been specific problems for platform workers in developing countries of under-payment, non-payment, arbitrary removal from platforms, unsocial and over-long hours, lack of redress for problems, loading of risk and cost onto workers, unsafe work, lack of employment rights or guarantees, etc.; and a more general outcome that this work leads to chronic precarity within a context of structural inequality (Heeks 2017). Workers in developing countries often compare this work not to the high benchmark of secure, unionised employment seen in the post-War period in the global North but, more favourably, to local benchmarks of insecure, informal employment (Heeks 2018b). Nonetheless, they participate in a highly-unequal part of the digital economy in which platforms capture the majority of value, and they generally do not have recourse to the legal infrastructure which, in some developed countries, has allowed workers to challenge the behaviour of platforms (Graham & Shaw 2017). With algorithmic and robotic automation on the rise, there seem few opportunities for capital—labour asymmetries to reverse themselves within the digital economy unless serious action is taken. Again, impacts are likely to be worse in developing countries where labour is in general terms less organised and less capable than in the global North.

Smaller enterprises, too, may also suffer adverse incorporation. Study of the impact of digital engagement by African micro-, small and medium enterprises found ICTs to reinforce the marginalisation of those enterprises (Murphy & Carmody 2015). While enterprises only saw incremental improvements to their bottom line, most high-value activity remained overseas: a type of “ICT-enabled extraversion” that saw African markets orienting to the needs and to the benefit of external actors, while local enterprises were forced into a milieu of hypercompetition for which they were ill-prepared and ill-suited.

Finally, we can also look at the flipside: at the “advantageous incorporation” of large digital firms into the digital economies of developing countries. This type of incorporation has often been associated with oligopoly or even monopoly. In the 20th century, the concern was mainly with this phenomenon in the telecommunications sector, where monopoly was

enabled by legislation and protectionism and the impact was high cost and low quality (Wentrup et al. 2016). In the 21st century, the concern has been more with the platform economy, where monopoly is enabled by markets and network effects. Problems include the impacts on labour discussed above, user lock-in and exclusion of competitors even if providing a cheaper or better service, and leveraging that uses monopoly in one digital market to facilitate monopoly in other digital markets (Fuchs 2017; Graham et al. 2017). Digital monopoly can and does bring network effect benefits to consumers, but the history of the digital economy to date has been more marked by the consumer benefits of competition in reducing costs and driving quality and innovation (e.g. Fong 2009; ITU/UNESCO 2011; Dutta et al. 2015).

Other Digital Harms

Other disbenefits associated with the spread of the digital economy can be seen relating to security and privacy. They impact consumers, workers, and enterprises and could be seen as part of adverse incorporation into digital markets, with growing vulnerability as the digital economy grows, leading to ever-more incidents of security breaches targeting corporate interests, national governments, and consumers (Nyirenda-Jere and Biru 2015). Most vulnerable to such attacks are developing countries, which are seen as an “ideal testing ground” by hackers for most dangerous attacks (Frenkel 2017). Due to developing countries’ weak security infrastructure, hackers are able to evade detection and use the vulnerabilities to test their malware before deploying it against more sophisticated defences. Examples include defrauding of US\$4m from financial accounts in Zambia (Shiloh & Fassassi 2016) or hackers stealing US\$81m from the Bangladesh Bank (Zetter 2016). As a broader example, it is estimated that cybercrime costs the Nigerian economy US\$500m per year (Shiloh & Fassassi 2016).

Growth of the digital economy is also allowing companies, governments and others to collect, retain and use increasing amounts of personal data for their own commercial or political purposes. Hence, there are growing concerns about loss of data privacy in developing countries (Heeks & Renken 2017); both what might be called “legitimate losses” such as those arising from the typical data gathering of large digital economy multinationals such as Facebook, Twitter and Amazon; “quasi-legitimate losses” to government surveillance; and “illegitimate losses” to hacking and the like (World Bank 2016). Combined concerns about security and privacy are seen to artificially suppress involvement of enterprises and consumers with the digital economy, owing to lack of trust (*ibid.*). This also feeds the “extraversion” noted above: for example, 90% of purchases made online by Cameroonian consumers were made on overseas websites (Etoundi et al. 2016).

These issues are sharpening with growth of cloud computing in developing countries. Cloud will be an important pillar of digital economy growth in these countries, alongside the efficiency and flexibility it can bring to the rest of the economy (UNCTAD 2013). But its typical model of cross-border data flows raises serious concerns about security and privacy, leading some governments – such as India, Indonesia and Zambia – to restrict usage, at least of overseas cloud services (Cowhey & Kleeman 2013). Such data localisation policies are claimed to slow expansion of the economy – including the digital economy – but may be seen as necessary in order to balance out this set of potential digital harms (Bauer et al. 2014).

3. Overview of Digital Economy Policy

Government needs to respond to the challenges identified in Section 2. The summary tables below present an overview of the policy issues and outcomes, and a selection of recommended policy instruments, following a template from Heeks (2016). These are organised in terms of the three challenge domains above – infrastructure, ecosystem and disbenefits – plus a more detailed discussion of governance processes and structures for digital economy policy.

3.1 Digital Infrastructure Policy

Digital Infrastructure Policy Objective: to ensure a pervasive and effective infrastructure for the digital economy		
Policy Issue	Desired Outcome	Recommended Policy Instruments
Unreliable / unavailable supply of electrical power	Improve electrical infrastructure	<ul style="list-style-type: none"> • Invest directly in power infrastructure • Encourage private sector investment in telecommunications infrastructure, including micro-scale • Encourage ‘smart grid’ innovation
Inadequate supply of technical infrastructure	Establish a pervasive, high-capacity, interoperable technical infrastructure	<ul style="list-style-type: none"> • Invest directly in telecommunications infrastructure • Encourage private sector and international finance institution investment in telecommunications infrastructure • Ensure independent regulation of telecommunications infrastructure • Address technical monopolies through competition policy reform • Establish clear guidelines (including competition vs. return-on-investment) for spectrum and other infrastructure planning, licensing and pricing • Regulate cost-based interconnection between networks, and infrastructure sharing • Review cost-benefit of taxation, pricing or other barriers that restrict access to infrastructure, networks and devices • Develop specific plans and incentives for (mobile) broadband • Develop country-level Internet Exchange Points • Set minimum, universal access speed and quality requirements
Insufficient data infrastructure	Create a pervasive, high-quality, interoperable data infrastructure	<ul style="list-style-type: none"> • Promote or mandate use of interoperable data standards • Invest in capacity for data capture, analytics and visualisation • Introduce regulations on data integrity, retention, consent, usage and administration • Incentivise development of local data / server / cloud computing centres

3.2 Digital Economy Ecosystems Policy

Digital Ecosystem Policy Objective: to ensure an effective digital ecosystem and an open, stable and enabling environment for the digital economy.		
Policy Issue	Desired Outcome	Recommended Policy Instruments
Lack of digital economy capabilities	A pervasive, full-spectrum set of digital economy production capabilities	<ul style="list-style-type: none"> • Embed ICT-related curricula into primary, secondary and tertiary education including higher-level entrepreneur and innovator competencies • Audit specific, local digital economy capability requirements • Provide specific support for building higher-level capacities among digital entrepreneurs • Provide subsidies or tax breaks for in-service digital economy training • Encourage return of digitally-trained citizens resident overseas • Review immigration policy impact on in-flow of digital economy workers and entrepreneurs
Limited access to finance	A high-performance and attractive investment environment	<ul style="list-style-type: none"> • Steer development financing, including crowd-funding, into digital economy investments • Provide direct (public) funding for digital economy investments • Support digital economy innovation through direct funding, subsidy and tax breaks • Encourage private sector funding of the digital economy including use of public-private partnerships and investment by foreign entrepreneurs and companies • Establish mechanisms conducive to venture capital funding • Make available specific financial support for digital start-ups and SMEs • Make available risk capital including consideration of scaling and growth capital and foreign direct investment • Support digital economy enterprises through other investments and incentives e.g. around R&D
Low levels of digital economy demand	Build digital economy consumption	<ul style="list-style-type: none"> • Support general programmes to improve basic, English and digital literacy • Support interventions to promote ICT application in all development sectors (health, education, agriculture, small enterprise, public administration, etc) • Run hackathons, competitions, etc for development of apps relevant to local development needs
Absent and outdated digital economy policies	The necessary legal framework to enable the digital economy	<ul style="list-style-type: none"> • Analyse and legislate for the specific requirements arising from digital platforms • Update taxation policy to address emerging digital economy • Update labour policy to address emerging digital economy • Promote legal recognition for digital signatures, identities, contracts and transactions

Poor institutional infrastructure for the digital economy	A supportive institutional infrastructure for the digital economy	<ul style="list-style-type: none"> • Identify and develop localised digital economy champions • Raise understanding and awareness of digital economy impacts • Develop effective public-private partnerships across digital economy financing, innovation, capacity-building, etc • Support for other bipartite (NGO-private; community-private) digital economy partnerships • Review and streamline digital economy regulations including digital enterprise start-up, operation, closure
Lack of specific support for digital economy start-ups and SMEs	Targeted digital economy support	<ul style="list-style-type: none"> • Provide business development services specifically for digital economy enterprises • Incentive-based mechanisms to encourage digital economy start-up and growth • Create hubs, incubators and accelerators that support and boost digital entrepreneurship • Develop digital economy techno-parks that foster enterprise clustering

3.3 Digital Economy Disbenefits Policy

Digital Economy Disbenefits Policy Objective: to reduce the emergent disbenefits/harms associated with the digital economy		
Policy Issue	Desired Outcome	Recommended Policy Instruments
Limited infrastructure in peripheral regions	Targeted financing for inclusive digital infrastructure initiatives	<ul style="list-style-type: none"> • Develop universal service funds (USFs) or obligations for mobile, Internet and other ICT infrastructure • Develop USFs or obligations for power infrastructure • Consider potential for other public funding or subsidy for remotest regions
Poor performance of universal service funds	Maximised USF effectiveness	<ul style="list-style-type: none"> • Set clear goals, targets, timelines and processes for collection and distribution of USFs • Review USFs and remove or revise if original goals achieved • Ensure open distribution of funds via transparent and consultative process with key stakeholders • Prioritise funding of least-cost technologies, and shared-access infrastructure
Absence of inclusive digital content	Development of inclusive local content	<ul style="list-style-type: none"> • Support local data content generation by capacity-building of data producer roles • Facilitate collaborative development of data content between local developers and broader actors including content distributors
Lack of ICT access in marginalised groups	Effective uptake of ICTs by marginalised groups	<ul style="list-style-type: none"> • Embed ICTs into government and NGO information and service delivery programmes • Establish competition policies to mandate operators to expand coverage into marginalised (low-income / rural) regions • Provide financial support (subsidy, tax exemption, etc.) for ICT goods and services to help accelerate access and affordability • Encourage inclusive innovation of low-cost devices and services for low-income users • Provide ICT capacity-building programmes and financial support for marginalised groups
Lack of digital economy participation by marginalised groups	Inclusive participation in digital economy	<ul style="list-style-type: none"> • Financial support for ICT incubators / hubs / clusters in marginalised communities • Promote role models of digital entrepreneurship from marginalised groups (women, youth, disabled, etc) • Target digital economy capability-building for marginalised groups • Support grassroots / marginalised digital entrepreneur links to formal sector (e.g. network events, fairs, competitions / awards, innovation databases, reports to amplify awareness of grassroots digital enterprise, marketing assistance, quality assurance, government procurement)

Adverse incorporation into digital economy	Fair incorporation into digital economy	<ul style="list-style-type: none"> • Fair / decent work standards for digital labour and other work in the digital economy • Regulatory and policy audit to ensure level playing field for smaller-scale and other more peripheral actors in the digital economy
Threats of malicious software, spam, phishing, identity theft, piracy, etc	Reduced levels of cybercrime	<ul style="list-style-type: none"> • Develop cyber security practices and regulations • Legislate to criminalise hacking • Raise awareness of cybercrime and cybersecurity through engagement programmes • Train and enhance practising cybersecurity professionals • Create cybersecurity agencies and capabilities • Extend conventional crime legislation to cover online activity
Vulnerable digital infrastructure	A secure digital environment	<ul style="list-style-type: none"> • Establish state-of-the-art secure digital infrastructure • Strengthen defences in cyberspace and improve ability to detect threats in cyberspace • Create appropriate anti-cyberterrorist and anti-cyberwarfare agencies and capacity at national and international level • Improve the structural arrangements for digital forensics, as well as the sophistication of the systems to monitor the Internet and detect cyber-attacks • Introduce measures for sharing and reporting information related to cyber attacks
Lack of protection for data and privacy	Protected digital rights	<ul style="list-style-type: none"> • Legislate right to online privacy as part of data protection • Create reporting instruments within ombuds, agencies and associations to easily monitor and report activities • Balance cross-border vs. localisation concerns in relation to data flow and cloud legislation • Develop “loose and limited IPR” legislation, balancing rights of digital economy producers and consumers • Extend labour legislation to cover the online domain • Commit to abide by UNESCO Code of Ethics for the Information Society (UNESCO 2011)
Emergence of digital economy monopolies	Reduce the disbenefits of info-monopolies	<ul style="list-style-type: none"> • Ensure anti-trust, anti-monopoly regulation and other competition law covers online and digital economy activity • Enable effective and developmental competition in digital economy sectors • Clarify application of taxation rules for online digital economy activities • Improve monitoring of digital financial flows

3.4 Governance of Digital Economy Policy

Governance of Digital Economy Policy Objective: to maximise effectiveness of digital economy policy structures and processes		
Policy Issue	Desired Outcome	Recommended Policy Instruments
Problems with capacity, policy structures, policy-making and implementation processes	Strengthen governance of digital economy policy	<ul style="list-style-type: none"> • Identify clear digital economy leadership • Conduct overall audit of all legislation and regulations relating to digital economy • Conduct Digital Economy Readiness appraisal • Implement a strong but agile governance structure to ensure accountability • Implement capacity-building on digital economy within the public service • Develop digital economy strategy through multi-stakeholder collaboratory approach • Utilise digital politics platforms for policy-making • Strengthen and broaden gathering of digital economy statistics • Develop metrics for policy evaluation, building on existing initiatives • Incorporate strong programme accountability and progress monitoring • Develop multi-country cooperation and best practices
Corruption	Reduce corruption in digital policy implementation	<ul style="list-style-type: none"> • Establish automated corruption reporting system • Adopt open procurement procedures for digital economy policy contracting • Adopt open government data policy for all digital economy-linked processes
Government bureaucracy	Reduce bureaucratic overhead	<ul style="list-style-type: none"> • Simplify customs regulations for digital goods • Simplify digital trade regulations • Implement broader “regulatory simplification” and institutional reforms for digital economy policy • Adopt agility as criterion for design of digital economy policy structures

Discussion

As explained for digital development policy more broadly (Heeks 2016)³, for digital economy development to be encouraged, more than new policy content is needed. Policy makers must also consider both the processes and structures through which digital economy policy is made, implemented and maintained.

Policy Lifecycle Processes

The various components of the policy-making process are discussed below, but one overarching requirement will be for policy leadership. Whether such leadership is emergent or can be created is a matter for debate (e.g. Renken & Heeks 2014). However, policy leadership – which typically comes from within national governments – is consistently recognised as a critical success factor in ICT-related policy (e.g. Heeks et al 2010, Biggs & Polomska 2013):

“At the heart of e-development are e-leaders and e-leadership institutions—individuals, networks, and institutions that develop a vision of a knowledge society, set policies and priorities, forge national consensus on reforms, and coordinate and create synergies among the elements of e-development” (Hanna 2008, p.2)

Analysis: Policy objectives and goals must be specific to each individual context, and evidence-based. The foundation for policy must therefore be a specific analysis of current actors and relations, strengths and weaknesses including indicators and causes of failures to achieve digital economy development. This could be seen as a digital economy audit or simply a SWOT analysis. Given that readiness surveys can also provide insight into the steps that policy needs to concentrate on, these might be usefully applied via a Digital Economy Readiness appraisal.

Planning and formulation: Given the range of actors within the digital economy ecosystem and the expectations of many about their relative autonomy in the digital realm (Thompson 2008), planning processes can benefit from incorporating more participatory components in order to better understand policy needs, content and impacts. This might particularly focus on understanding the digital economy constraints and disbenefits that have been outlined previously. However, given limited levels of knowledge about many digital economy issues, there may need to be concerted awareness-raising, teaching and even capacity-building activities before a more participatory approach to policy is feasible (CIPESA 2014). It would be appropriate for policy-making to make use of new digital politics platforms.

Implementation: There is evidence that digital economy policies can often be dissipated, avoided or appropriated, rendering policy instruments that seem useful less powerful or even powerless on the ground (Foster & Heeks 2013). It is therefore important to take a localised, ‘front-line’ perspective on digital economy policy. This should clearly define the institutions that will be implementing policy, ensure they have sufficient human and technical capacities to implement, and also identify the incentives that will align local behaviour with policy intentions.

Monitoring and evaluation: Tracking and understanding the progress of digital economy policies requires metrics for evaluation of success/failure. Development of such metrics can

³ Text in this section is a modified version of that presented in the Heeks (2016) paper.

build on existing multi-stakeholder initiatives such as the Partnership on Measuring ICT for Development (e.g. ITU 2014b) and on other work on measuring the digital economy (e.g. OECD 2013a). Both these and any related audit or readiness measurement could focus on the three areas of: Infrastructure, Ecosystem, Disbenefits. Because policy for the digital economy may move governments into uncertain territory, it is also important there be mechanisms to enable learning and incremental adjustment to policy.

Policy Structure

As the digital economy grows, it touches on the responsibilities of increasing numbers of stakeholders, which could extend as far as those shown in Table 1 (adapted from Heeks 2016).

Policy Actors	Policy Responsibilities
Core Digital Economy Policy (e.g. Ministry of ICT)	Technical and social elements of policy shown above: infrastructure, ecosystem and disbenefits
Core ICT Policy (e.g. Ministry of ICT)	Technical and data elements of digital infrastructure, ecosystem and disbenefits policies
Contextual Policy (e.g. Ministries of Finance, Enterprise, Trade & Industry, Education, Science & Technology)	Broader aspects of digital ecosystem and digital disbenefits policies: finance, capabilities, digital processes, business development, innovation
Specific Policy	Particular aspects of particular policies e.g. digital infrastructure (Ministry of Telecommunications; Ministry of Power); digital ecosystem (Ministry of Education; Ministry of Trade & Industry); digital disbenefits (Ministry of Community Development; Ministry of Information and Media; Ministry of Trade & Industry)
Sectoral Policy (e.g. Ministries of Agriculture, Health, Education, Finance, Enterprise, Public Administration, National Security, etc)	Sectoral aspects of digital economy policy that touch on other sectors of the economy
International Policy (e.g. UN and other supranational bodies)	Cross-national aspects to digital economy policies
Business Strategy (e.g. leading, transnational digital corporations)	Recognition that business strategies of key digital corporations form part of the digital economy policy system

Table 1: Digital economy policy responsibilities

However, there are several dangers in this profusion of potential digital economy policy stakeholders (Heeks 2010). These include a lack of adequate understanding of digital economy issues within mainstream Ministries, and fragmentation and incoherence of digital economy policy. Because it is so cross-cutting and potentially transformative, expansion of the digital economy will be a significant challenge to governments because of their relatively

silo-type structures. A cross-cutting structure may need to be created which also reflects the moves towards more networked models of governance.

This will be something like a “Digital Economy Policy Collaboratory”, summarised graphically in Figure 6. This will perform a dual bridging role, drawing in horizontally policy actors from both ICT and development / context; and drawing in vertically those connected with both government and other sectors:

“Experiences with various types of ICT policy suggest the value of autonomous and capable state agencies, combined with strong representative bodies for both the private sector and civil society and a mechanism for robust interaction between these three groups” (Heeks 2009, p.26).

The issue of who participates is particularly sensitive since the goals and interests will differ from actor to actor; but the nature of policy will be determined by who is allowed to participate in policy making.

Digital Economy Policy Collaboratories should also adopt an experimental and iterative approach to policy, allowing the incremental learning and policy revision point noted above.

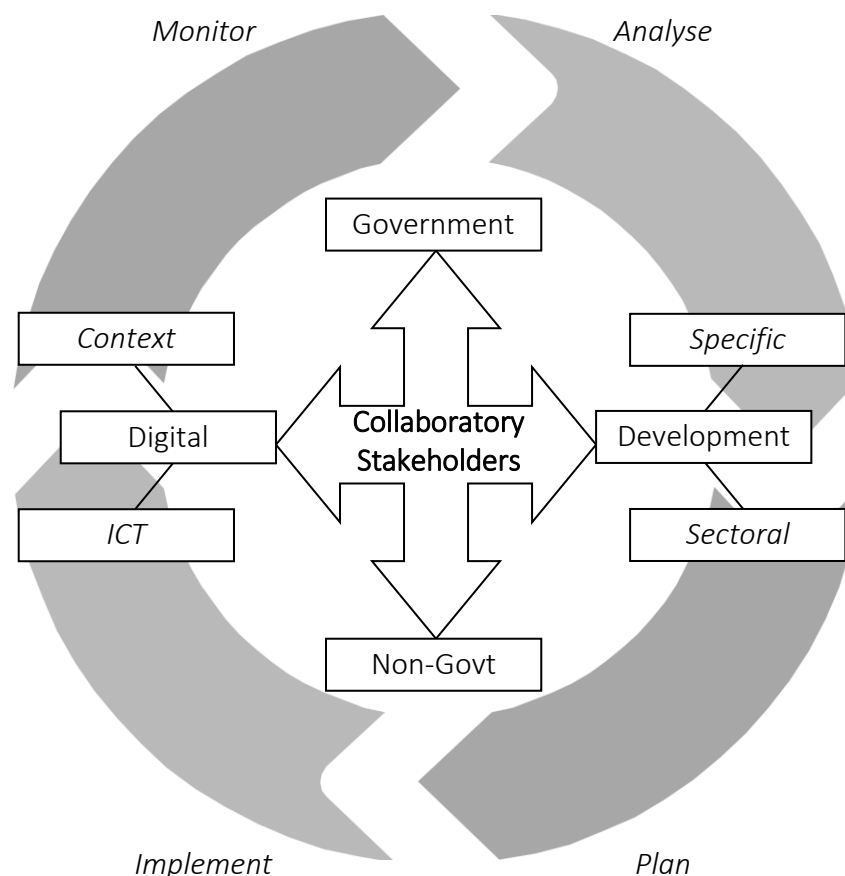


Figure 6: Digital economy policy collaboratory

A Policy Collaboratory approach is also important because of increasing recognition of the need for policy coherence and, conversely, of the damage of incoherent, inconsistent or conflicting policies (OECD 2013b). Indeed, the principles of policy coherence reflect the guidance offered above (*ibid.*, p.2):

- “ensuring that the interactions among various policies in the economic, social, environmental, legal and political domains support countries on their pathway towards inclusive sustainable growth;
- putting in place institutional mechanisms, processes, and tools to produce effective, efficient, sustainable and coherent policies in all sectors;
- developing evidence-based analysis, sound data and reliable indicators to inform decision making and help translate political commitments into practice; and
- fostering multi-stakeholder policy dialogue to identify the barriers to, and the catalysts for, change”.

References

- ADB. (2015). *Aid for Trade in Asia and the Pacific: Thinking Forward about Trade Costs and the Digital Economy*. Asian Development Bank, Manila.
<https://www.adb.org/sites/default/files/publication/167344/aft-report-2015.pdf>
- Aker, J.C. and Mbiti, I.M. (2011). Mobile Phones and Economic Development in Africa. *Journal of Economic Perspectives*, 24(3), 207-232. <https://www.aeaweb.org/articles?id=10.1257/jep.24.3.207>
- Alliance for Affordable Internet. (2015). *Affordability Report 2015/16*. Alliance for Affordable Internet, Washington, DC. <http://1e8q3q16vyc81g8l3h3md6q5f5e.wpengine.netdna-cdn.com/wp-content/uploads/2016/04/A4AI-2015-16-Affordability-Report.pdf>
- Alliance for Affordable Internet. (2017). *2017 Affordability Report*. Alliance for Affordable Internet, Washington, DC. <http://1e8q3q16vyc81g8l3h3md6q5f5e.wpengine.netdna-cdn.com/wp-content/uploads/2017/02/A4AI-2017-Affordability-Report.pdf>
- AlphaBeta. (2017). *Digital Nation: Policy Levers for Investment and Growth*. AlphaBeta, Sydney.
http://www.alphabeta.com/wp-content/uploads/2017/05/DigiNations_FA.pdf
- Alyoubi, A.A. (2015). E-Commerce in Developing Countries and How to Develop them During the Introduction of Modern Systems. *Procedia Computer Science*, 65, 479-483.
<http://dx.doi.org/10.1016/j.procs.2015.09.127>
- Bauer, M., Lee-Makiyama, H., van der Marel, E. and Vershelde, B. (2014). *The Costs of Data Localisation: Friendly Fire on Economic Recovery*, ECIPE Occasional Paper No. 3/2014. European Centre for International Political Economy, Brussels.
http://www.ecipe.org/app/uploads/2014/12/OCC32014_1.pdf
- Biggs, P. and Polomska, A. (2013). The importance of national policy leadership, in: B. Bilbao-Osorio, S. Dutta & B. Lanvin (eds), *The Global Information Technology Report 2013*, 53-65. World Economic Forum, Geneva. http://www3.weforum.org/docs/WEF_GITR_Report_2013.pdf
- Bukht, R. and Heeks, R. (2017). *Defining, Conceptualising and Measuring the Digital Economy*, Development Informatics working paper 68. University of Manchester, UK
<https://www.gdi.manchester.ac.uk/research/publications/di/>
- Chang, A.M. (2015). Foreign Assistance in the Digital Age. In *Prepared for the 2015 Brookings Blum Roundtable*, 1-7. <https://www.brookings.edu/wp-content/uploads/2016/07/ChangForeignAssistanceintheDigitalAge.pdf>
- CIPESA. (2014). *State of Internet Freedoms in East Africa 2014*. Collaboration on International ICT Policy in East and Southern Africa. http://www.cipesa.org/?wpfb_dl=76
- Cowhey, P. and Kleeman, M. (2013). *Unlocking the Benefits of Cloud Computing for Emerging Economies*. University of California, San Diego, CA.
https://gps.ucsd.edu/files/faculty/cowhey/cowhey_profile_10182012.pdf
- Dahlman, C., Mealy, S. and Wermelinger, M. (2016). *Harnessing the Digital Economy for Developing Countries*. OECD, Paris.
[http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DEV/DOC/WKP\(2016\)6&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DEV/DOC/WKP(2016)6&docLanguage=En)
- Damarillo, W. (2011). How Cloud Computing Can Boost Developing Nations. *Forbes*, 3 Nov.
<https://www.forbes.com/sites/ciocentral/2011/11/03/how-cloud-computing-can-boost-developing-nations/#7fedaa2f1ed2>

- Dubey, A., Abhinav, K., Hamilton, M. and Kass, A. (2017). Analyzing gender pay gap in freelancing marketplace, in: D. Beimborn, R. Sharma & S.C. Srivastava (eds), *Proceedings of the 2017 ACM SIGMIS Conference on Computers and People Research*, 13-19. ACM, New York, NY.
<https://dl.acm.org/citation.cfm?id=3084381.3084402>
- Dutta, S., Geiger, T. and Lanvin, B. (2015). *The Global Information Technology Report 2015: ICTs for Inclusive Growth*. World Economic Forum, Geneva.
http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf
- eBay. (2013). *Commerce 3.0 for Development*. eBay, Washington, DC.
https://www.ebaymainstreet.com/sites/default/files/eBay_Commerce-3-for-Development.pdf
- Etoundi, R.A., Onana, F.S.M., Olle, G.D.O. and Eteme, A.A. (2016). Development of the Digital Economy in Cameroon: Challenges and Perspectives. *Electronic Journal of Information Systems in Developing Countries*, 76(7), 1-24. <http://onlinelibrary.wiley.com/doi/10.1002/j.1681-4835.2016.tb00558.x/pdf>
- European Commission. (2013). *Expert Group on Taxation of the Digital Economy*. European Commission, Brussels.
http://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/good_governance_matters/digital/general_issues.pdf
- European Commission. (2015). *Monitoring the Digital Economy & Society 2016 - 2021*. European Commission, DG Communications Networks, Content & Technology, Brussels.
<http://ec.europa.eu/eurostat/documents/341889/725524/Monitoring+the+Digital+Economy+%26+Society+2016-2021/7df02d85-698a-4a87-a6b1-7994df7fbeb7>
- Fong, M.W.L. (2009). Digital Divide: The Case of Developing Countries. *Issues in Informing Science and Information Technology*, 6, 471-478. <http://iisit.org/Vol6/IISITv6p471-478Fong597.pdf>
- Foster, C. and Heeks, R. (2013). Analyzing policy for inclusive innovation, *Innovation and Development*, 3(1), 103-119. <http://www.tandfonline.com/doi/abs/10.1080/2157930X.2013.764628>
- Frenkel, S. (2017). Hackers Find 'Ideal Testing Ground' for Attacks: Developing Countries. *The New York Times*, 2 Jul. <https://www.nytimes.com/2017/07/02/technology/hackers-find-ideal-testing-ground-for-attacks-developing-countries.html>
- Fuchs, C. (2017). Capitalism, Patriarchy, Slavery, and Racism in the Age of Digital Capitalism and Digital Labour. *Critical Sociology*, advance online publication.
<http://journals.sagepub.com/doi/10.1177/0896920517691108>
- Graham, M., Lehdonvirta, V., Wood, A., Barnard, H., Hjorth, I. and Simon, D.P. (2017). *The Risks and Rewards of Online Gig Work At the Global Margins*. Oxford Internet Institute, University of Oxford, UK. <https://www.oii.ox.ac.uk/publications/gigwork.pdf>
- Graham, M. and Shaw, J. (eds) (2017). *Towards a Fairer Gig Economy*, Meatspace Press
<http://meatspacepress.org/go/tafge-internet-archive-pdf/>
- Greengard, S. (2010). Cloud Computing and Developing Nations. *Communications of the ACM*, 53(5), 18. <http://portal.acm.org/citation.cfm?doid=1735223.1735232>
- GSMA. (2011). *African Mobile Observatory 2011: Driving Economic and Social Development through Mobile Services*. GSMA, London. <http://www.gsma.com/spectrum/wp-content/uploads/2011/12/Africa-Mobile-Observatory-2011.pdf>
- Hanna, N.K. (2008). Why a holistic e-development framework?, *Information Technologies and International Development*, 4(4), 1-7. <http://itidjournal.org/itid/article/viewFile/306/138>

- Heeks, R. (2009). *The ICT4D 2.0 Manifesto: Where Next for ICTs and International Development?*, Development Informatics Working Paper no.42. IDPM, University of Manchester, UK.
<http://www.gdi.manchester.ac.uk/research/publications/working-papers/di/di-wp42/>
- Heeks, R. (2010). Mainstreaming ICTs in development, *ICT4DBlog*, 30 Oct.
<http://ict4dblog.wordpress.com/2010/10/30/mainstreaming-icts-in-development-the-case-against/>
- Heeks, R. (2016). *Examining "Digital Development": The Shape of Things to Come?* GDI Development Informatics Working Paper no.64, University of Manchester, UK.
<https://www.gdi.manchester.ac.uk/research/publications/di/>
- Heeks, R. (2017). *Decent Work and the Digital Gig Economy*. GDI Development Informatics Working Paper no.71, University of Manchester, UK.
<https://www.gdi.manchester.ac.uk/research/publications/di/>
- Heeks, R. (2018a). *Information and Communication Technology for Development (ICT4D)*. Routledge, London. <https://www.routledge.com/Information-and-Communication-Technology-for-Development-ICT4D/Heeks/p/book/9781138101814>
- Heeks, R. (2018b) Institutional theory and platform labour in developing countries, paper presented at international workshop, *Development Implications of Digital Economies: Theory and Methods*, Cape Town, South Africa, 22-23 Jan. <https://diodeweb.files.wordpress.com/2018/01/heels-cape-town-diode-workshop-presentation.pptx>
- Heeks, R. and Renken, J. (2017). Data justice for development: what would it mean?, *Information Development*, advance online publication.
<http://journals.sagepub.com/doi/abs/10.1177/0266666916678282>
- Heeks, R., Gao, P. and Ospina, A. (2010). *Delivering Coherent ICT Policies in Developing Countries*, e-Development Briefing 14. Centre for Development Informatics, University of Manchester, UK
http://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/di/dig_briefing/DIGBriefting14PolicyCoherence.pdf
- Hilbert, M. (2016). Big data for development: A review of promises and challenges. *Development Policy Review*, 34(1), 135-174. <http://onlinelibrary.wiley.com/doi/10.1111/dpr.12142/full>
- House of Commons. (2016). *The Digital Economy: Second Report of Session 2016–17. Ordered by the House of Commons to be Printed 12 July 2016*. House of Commons, Business, Innovation and Skills Committee, London. <http://raconteur.net/the-digital-economy-2016>
- House of Commons: Science and Technology Select Committee. (2016). *Digital Skills Crisis: Second Report of Session 2016–17*. House of Commons, Science and Technology Select Committee, London. <http://www.publications.parliament.uk/pa/cm201617/cmselect/cmsctech/270/27002.htm>
- Hussain, S. and Mohan, R. (2008). Localization in Asia Pacific. In F. Librero & P. B. Arinto, eds. *Digital Review of Asia Pacific 2007/2008*, 43-58. International Development Research Centre, Ottawa.
<https://www.idrc.ca/en/book/digital-review-asia-pacific-2007-2008>
- InternetWorldStats. (2017). *Internet World Users by Language*. InternetWorldStats.
<http://www.internetworldstats.com/stats7.htm>
- ITU. (2014a). *Measuring the Information Society Report: 2014*. International Telecommunication Union, Geneva. https://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf

- ITU. (2014b). *Partnerships on Measuring ICT for Development. Final WSIS Targets Review: Achievements, Challenges and the Way Forward*. International Telecommunication Union, Geneva. http://www.itu.int/en/ITU-D/Statistics/Documents/publications/wsisreview2014/WSIS2014_review.pdf
- ITU. (2015). *ICT Facts & Figures: The World in 2015*. International Telecommunication Union, Geneva. <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf>
- ITU/UNESCO. (2011). *Broadband: A Platform for Progress: A Report by the Broadband Commission for Digital Development*. International Telecommunication Union and UNESCO, Paris. <http://unesdoc.unesco.org/images/0021/002198/219825e.pdf>
- Johns, N. (2015). *Regulating The Digital Economy*. Observer Research Foundation, New Delhi. http://cf.orfonline.org/wp-content/uploads/2015/12/SR_06.pdf
- Knickrehm, M., Berthon, B. and Daugherty, P. (2016). *Digital Disruption: The Growth Multiplier. Optimizing Digital Investments to Realize Higher Productivity and Growth*. Accenture, New York, NY. https://www.accenture.com/_acnmedia/PDF-4/Accenture-Strategy-Digital-Disruption-Growth-Multiplier.pdf
- KPMG. (2017). *Impact of Internet and Digitisation on SMBs in India: A Study by KPMG in India and Google*. KPMG and Google, Gurgaon, India. <https://assets.kpmg.com/content/dam/kpmg/in/pdf/2017/01/Impact-of-internet-and-digitisation.pdf>
- Kuek, S.C. et al. (2015). *The Global Opportunity in Online Outsourcing*. World Bank, Washington, DC. <http://documents.worldbank.org/curated/en/138371468000900555/The-global-opportunity-in-online-outsourcing>
- Lazovic, V. and Kovacevic, D. (2010). Internet and its Fundamental Impact on Functioning of the New Information Economy. In *6th International Conference of ASECU*. ASECU, Podgorica. <http://www.asecu.gr/files/6th-international-conference-asecu-podgorica-may-2010.pdf>
- Lazovic, V. and Tamara, D. (2014). The Digital Economy in Developing Countries - Challenges and Opportunities. In *The 38th International Convention on Information and Communication Technology, Electronics and Microelectronics*, 1580-1584. <http://ieeexplore.ieee.org/document/6859817/>
- Lehdonvirta, V., Barnard, H., Graham, M. and Hjorth, I. (2014). Online Labour Markets – Leveling the Playing Field for International Service Markets?, paper presented at *IPP2014: Crowdsourcing for Politics and Policy*, Oxford, UK, 25-26 Sep. http://ipp.oii.ox.ac.uk/sites/ipp/files/documents/IPP2014_Lehdonvirta_0.pdf
- Lui, K. (2017). China Just Made It Even Harder to Get Around the Great Firewall. *TIME*, 23 Jan. <http://time.com/4642916/china-vpn-internet-great-firewall-censorship/>
- Lund, S. and Manyika, J. (2016). *How Digital Trade is Transforming Globalisation*. World Economic Forum, Geneva. <http://e15initiative.org/wp-content/uploads/2015/09/E15-Digital-Lund-and-Manyika.pdf>
- Manyika, J., Lund, S., Bughin, J., Woetzel, J., Stamenov, K. and Dhingra, D. (2016a). *Digital Globalization*. McKinsey Global Institute, San Francisco, CA. <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows>
- Manyika, J., Lund, S., Singer, M., White, O. and Berry, C. (2016b). *Digital Finance for All*. McKinsey Global Institute, San Francisco, CA. <https://www.mckinsey.com/global-themes/employment-and-growth/how-digital-finance-could-boost-growth-in-emerging-economies>

- Marcus, A., Weinelt, B. and Goutrobe, A. (2015). *Expanding Participation and Boosting Growth: The Infrastructure Needs of the Digital Economy*. World Economic Forum, Geneva.
http://www3.weforum.org/docs/WEFUSA_DigitalInfrastructure_Report2015.pdf
- Meltzer, J. (2014). Supporting the Internet As a Platform for International Trade Opportunities for Small and Medium-Sized Enterprises and Developing Countries. *Global Economy & Development*, (February), 69. <https://www.brookings.edu/wp-content/uploads/2016/07/02-internet-international-trade-meltzer.pdf>
- Meltzer, J.P. (2016). *Maximizing the Opportunities of the Internet for International Trade*. World Economic Forum, Geneva.
http://www3.weforum.org/docs/E15/WEF_Digital_Trade_report_2015_1401.pdf
- Meng, Q. and Li, M. (2002). New Economy and ICT Development in China. *Information Economics and Policy*, 14(2), 275-295. <https://www.sciencedirect.com/science/article/pii/S0167624501000701>
- Murphy, J.T. and Carmody, P. (2015). *Africa's Information Revolution*. John Wiley, Chichester, UK.
<https://www.wiley.com/en-gb/Africa's+Information+Revolution:+Technical+Regimes+and+Production+Networks+in+South+Africa+and+Tanzania-p-9781118751329>
- Mutula, S.M. and van Brakel, P. (2007). ICT Skills Readiness for the Emerging Global Digital Economy among Small Businesses in Developing Countries: Case Study of Botswana. *Library Hi Tech*, 25(2), 231-245. <http://www.emeraldinsight.com/doi/full/10.1108/07378830710754992>
- NISC. (2013). *Cybersecurity Strategy: Towards a World-Leading, Resilient and Vigorous Cyberspace*. National Information Security Center, Tokyo. <https://www.nisc.go.jp/eng/pdf/cybersecuritystrategy-en.pdf>
- Nottebohm, O., Manyika, J., Bughin, J., Chui, M. and Syed, A.-R. (2012). *Online and Upcoming: The Internet's Impact on Aspiring Countries*. McKinsey Global Institute, San Francisco, CA.
<http://www.innovacion.cl/wp-content/uploads/2012/05/Internet.pdf>
- Nyirenda-Jere, T. and Biru, T. (2015). *Internet Development and Internet Governance in Africa*. Internet Society, Geneva. <https://www.internetsociety.org/resources/doc/2015/internet-development-and-internet-governance-in-africa/>
- OECD. (2013a). *Measuring the Internet Economy*. OECD, Paris.
<http://dx.doi.org/10.1787/5k43gig6r8jf-en>
- OECD. (2013b). *Policy Coherence for Inclusive and Sustainable Development*. OECD, Paris.
<http://www.oecd.org/development/pcd/POST-2015%20PCD.pdf>
- OECD. (2015). *In It Together: Why Less Inequality Benefits All*. OECD, Paris.
<http://www.oecd.org/social/in-it-together-why-less-inequality-benefits-all-9789264235120-en.htm>
- Okeleke, K. and Stryjak, J. (2015). *Building Digital Societies in Asia*. GSMA, London.
<https://www.gsmainelligence.com/research/?file=bd5b3cf1d0533f9c9641039ba6966864&download>
- Quinones, G., Nicholson, B. and Heeks, R. (2015). A Literature Review of E-Entrepreneurship in Emerging Economies: Positioning Research on Latin American Digital Startups. In R. L. La Rovere, L. de M. Ozório, & L. de J. Melo, eds. *Entrepreneurship in BRICS*, 179-208. Springer, Cham.
<http://link.springer.com/10.1007/978-3-319-11412-5>

Renken, J. and Heeks, R. (2014). Champions of information systems innovations: thematic analysis and future research agenda, paper presented at *UK Association of Information Systems 2014* annual conference, University of Oxford, UK, 8-9 Apr.

<http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1041&context=ukais2014>

Schwab, K. (2016). *The Global Competitiveness Report 2016–2017*. World Economic Forum, Geneva.

<https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1>

Shiloh, J. and Fassassi, A. (2016). Cybercrime in Africa: facts and figures, *SciDevNet*, 7 Jul.

<https://www.scidev.net/sub-saharan-africa/icts/feature/cybercrime-africa-facts-figures.html>

Strategy& (2012). *Digitization in Emerging Economies*. Strategy&, Beirut.

https://www.strategyand.pwc.com/media/file/Strategyand_Digitization-in-Emerging-Economies.pdf

Taylor, L. (2015). Inside the Black Box of Internet Adoption: The Role of Migration and Networking in Internet Penetration in West Africa. *Policy and Internet*, 7(4), 423-446.

<http://onlinelibrary.wiley.com/doi/10.1002/poi3.87/abstract>

Thompson, M. (2008). ICT and development studies: towards development 2.0, *Journal of International Development*, 20, 821-835.

<http://onlinelibrary.wiley.com/doi/10.1002/jid.1498/abstract>

UNCTAD. (2013). *Information Economy Report 2013: The Cloud Economy and Developing Countries*. United Nations Conference on Trade and Development, Geneva.

<http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=710>

UNCTAD. (2015). *Information Economy Report 2015: Unlocking the Potential of E-commerce in Developing Countries*. United Nations Conference on Trade and Development, Geneva.

http://unctad.org/en/PublicationsLibrary/ier2015_en.pdf

UNDAW. (2005). *Gender Equality and Empowerment of Women through ICT Gender Equality and Empowerment*. United Nations Division for the Advancement of Women, New York, NY.

<http://www.un.org/womenwatch/daw/public/w2000-09.05-ict-e.pdf>

UNESCO (2011) *Code of Ethics for the Information Society*. United Nations Educational, Scientific and Cultural Organization, Paris. <http://unesdoc.unesco.org/images/0021/002126/212696e.pdf>

UNESCO. (2015). *A Decade of Promoting Multilingualism in Cyberspace*. United Nations Educational, Scientific and Cultural Organization, Paris.

<http://unesdoc.unesco.org/images/0023/002327/232743e.pdf>

Van Welsum, D. (2016). *Sharing is Caring?: Not Quite Some Observations About the Sharing Economy*. World Bank, Washington, DC.

<http://documents.worldbank.org/curated/en/2016/02/25858858/world-development-report-2016-digital-dividends-sharing-caring-not-quite-some-observations-sharing-economy>

Wentrup, R., Xu, X., Nakamura, H.R. and Strom, P. (2016). Crossing the Digital Desert in Sub-Saharan Africa: Does Policy Matter? *Policy and Internet*, 8(3), 248-269.

<http://onlinelibrary.wiley.com/doi/10.1002/poi3.123/abstract>

World Bank. (2013). *Philippine Development Report: Creating More and Better Jobs*. World Bank. Manila.

<http://documents.worldbank.org/curated/en/895661468092965770/pdf/ACS58420WP0P120Box0382112B00PUBLIC0.pdf>

World Bank. (2016). *Digital Dividends: World Development Report 2016*. World Bank, Washington, DC. <http://www.worldbank.org/en/publication/wdr2016>

World Wide Web Foundation. (2015). *Women's Rights Online: Translating Access into Empowerment*. World Wide Web Foundation, Geneva.

<http://webfoundation.org/docs/2015/10/womens-rights-online21102015.pdf>

WTO. (2013). *e-Commerce in Developing Countries - Opportunities and Challenges for Small and Medium-sized Enterprises*. World Trade Organization, Geneva.

https://www.wto.org/english/res_e/booksp_e/ecom_brochure_e.pdf

Yonazi, E., Kelly, T., Halewood, N. and Blackman, C. (2012). *The Transformational Use of Information and Communication Technologies in Africa*. World Bank, Washington, DC.

<http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1346223280837/MainReport.pdf>

Zervas, G., Proserpio, D. and Byers, J.W. (2015). The Impact of the Sharing Economy on the Hotel Industry. *Proceedings of the Sixteenth ACM Conference on Economics and Computation - EC '15*, 637-637. <http://dl.acm.org/citation.cfm?doid=2764468.2764524>

Zetter, K. (2016). That insane, \$81m Bangladesh bank heist, *Wired*, 17 May.

<https://www.wired.com/2016/05/insane-81m-bangladesh-bank-heist-heres-know/>