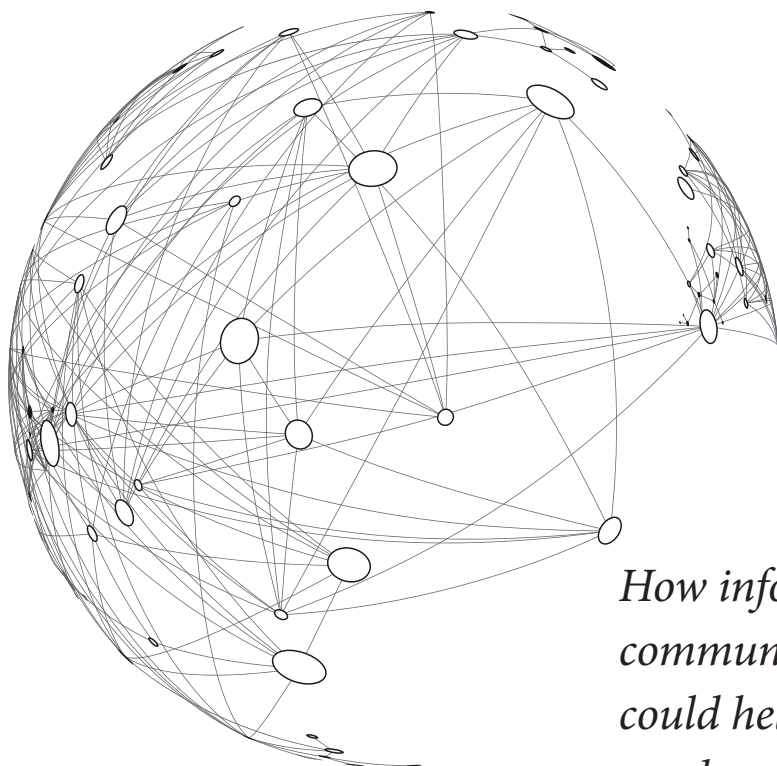


# connecting to work



*How information and  
communication technologies  
could help expand  
employment opportunities*

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# table of contents

1	Introduction .....	6
2	ICTs and work .....	8
3	ICT employs workers .....	14
4	ICT empowers workers .....	22
5	Challenges and risks .....	34
6	Enablers for impact .....	40
7	Conclusions and policy recommendations .....	54
8	References & notes .....	56

## List of Boxes, Figures, and Tables

Box A.	ICT supports entrepreneurship opportunities at the bottom of the pyramid .....	18
Box B.	Finding jobs .....	24
Box C.	Microwork in the corporate world: A case study .....	26
Box D.	Impact sourcing: Combining global outsourcing with social impact .....	20
Box E.	Ranking a location's ability to attract ICT jobs .....	34
Figure 1.	Global trends in ICT access and use .....	10
Figure 2.	Comparing hourly wages: Online (on Elance) versus national averages .....	26
Figure 3.	Labor participation and tertiary school enrollment .....	29
Table 1.	Job search techniques in Sri Lanka .....	22
Table 2.	Examples of the types of tasks on oDesk .....	25

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# ngt to work



# 1. Introduction

Information & communication technologies (ICTs) have been playing an increasingly important and complex role in the world of work over the past few decades. As a sector, ICT has grown and now employs millions of people worldwide as producers and advanced users of ICT tools. The proliferation of ICTs has also helped digitize how people find and do work. As such, ICT is influencing employment as an industry and as a tool.

These emerging ICT-enabled employment opportunities matter because countries around the world are looking to create more good jobs, which have positive economic and social implications not only for the worker but also for society.\* The world will need to create over 600 million jobs by 2030 for unemployment to remain at current levels.<sup>1</sup> As of 2012, more than 600 million young people globally were neither working nor studying.<sup>2</sup> ICT-enabled employment may help address some of this problem, both by creating jobs in the ICT sector, and by helping to make labor markets more inclusive, innovative, flexible, and transparent.

These potential gains are not without risks and challenges. Jobs may be lost due to automation or

displacement of work. Workers have seen their jobs transformed, and students and older workers face labor markets with rapidly evolving skills needs.

However, these changes are inevitable. ICTs will become more widespread, and businesses around the world will seek to maximize labor productivity. Jobs will move locations, and some skills will attract a higher demand while others might lose relevance. Some countries, regions, and cities will benefit while others might lose out on the opportunity. The benefits will shift to those students, workers, firms, and governments who prepare for these changes.

This brings us to our main question: *What could governments do to prepare for these changes and maximize employment opportunities?* This policy note provides a starting point for an answer to this complex question.

This note is a first step in a planned ongoing effort by the World Bank's ICT sector team to understand how ICTs are shaping and changing work, and transforming labor markets, and how governments and other stakeholders might respond to leverage the growth of ICTs to help increase employment opportunities.<sup>†</sup>

\* "Good jobs for development are those that make the greatest contribution to society, taking into account the value they have to the people who hold them, but also their potential spillovers on others—positive or negative." The World Bank, World Development Report (WDR) 2013: Jobs, (Washington DC: The World Bank Group, 2012), 20.

† Due to limited data availability, as well as the nature of this policy note as being a precursor for further analysis, the study relies on secondary sources to understand how ICTs have influenced employment. The primary intention here is to describe and analyze, and to develop a framework for further research and analysis.



The policy note is structured as follows. After this introduction, Section 2 defines the scope of this note, focusing on the types of employment opportunities due to ICT as a sector and as a tool. It then discusses in detail the global drivers behind these opportunities. Section 3 considers the impact of the ICT sector on employment. This section covers employment in ICT production such as software programming, IT services, telecommunications. It also identifies some possible growth areas for the future, such as green technologies and mobile applications.

Section 4 describes how ICTs as tools empower and include more workers in labor markets. Here, we take a perspective of the opportunities available to ICT-enabled workers through online marketplaces and via online employment. Our attention then turns in Section 5 to an analysis of the challenges and risks that appear alongside these opportunities.

Section 6 discusses in detail the various systems that will enable greater positive impact of ICT in employment, including the human capital, infrastructure, financial, regulatory, and social systems that will enable this trend. This also identifies an initial set of ideas for policy-makers to consider that would increase ICT-enabled employment opportunities, including some enablers for impact.

In closing, Section 7 identifies some of the key strategic themes for governments to consider as they make the effort to maximize the gains from ICT's increasing role in the world of work.

## 2. ICTs and work

The intersections between ICTs and work are numerous. Computers, the Internet, wireless networks and mobile devices, and the software and applications that use those technologies are now an integral part of work around the world. They have reshaped the nature of work, the workplace, and the relationships among workers and between workers and employers.

This policy note focuses on two specific intersections within the broad range of ICT-enabled employment. The first focuses on how ICT has created jobs as a sector. These *ICT jobs* are the result of the growth of the ICT sector, which today directly employs millions of people worldwide.

The second focuses on ICTs as tools: they have been helping more people find work and, as work has become digitized, do work. Such *ICT-enabled work* arises from the digitization of the job search process and of work itself. This section defines these two phenomena and provides an overview of their scope in the developing world. It then discusses the drivers behind these aspects of ICTs and work, and closes with a brief discussion of some of the challenges for employers and workers.

### 2.1 ICT jobs

The first aspect this policy note discusses is how ICT as a sector has generated employment. This includes ICT jobs, which are directly created through the production of ICT and through the intensive use of ICT. This borrows from a useful classification proposed by the Organisation

for Economic Co-operation and Development (OECD),<sup>3</sup> which includes the following three categories of workers:

- *ICT specialists*, who “develop and put in place the ICT tools for others,” and where the main output of the job is ICT;
- *Advanced users*, i.e., a “competent user of advanced, and often sector-specific, software tools,” and where “ICTs are not the main job but a tool”; and
- *Basic users*, who are “competent users of generic tools . . . needed for the information society, e-government and working life,” and where “ICTs are a tool, not the main job.”

Every economy will have these categories of ICT jobs to varying extents. For example, the OECD’s analysis finds that by 2003, ICT specialists were 4.7 percent of Sweden’s labor force but only 2.1 percent of Belgium’s.<sup>4</sup> The number of full-time equivalent (FTE) telecommunication employees, per data collected by the International Telecommunications Union (ITU), provides some insight into one part of the number of ICT specialists in various economies, including the developing world. In 2010, Bhutan had 763 FTEs, Cambodia had 6,386 FTEs, and Djibouti had 936 FTEs (of which a quarter were females).<sup>5</sup>

Advanced and basic users—together called ICT-intensive users—also exist in almost every economy. Overall, the OECD’s estimates suggest that the total of ICT specialists and intensive

users accounts for about 20 percent of total employment in a range of countries surveyed from North America and Europe.<sup>6</sup>

In sum, the ICT sector creates ICT jobs for specialists who produce ICT, and ICT-intensive users who consume ICT. However, there is a lack of data about the number of ICT jobs, especially in the developing world. Indeed, more data was available in the 1990s, when the sector was dominated by telecommunications companies, than there is now, when the proliferation of ICTs has spawned a range of businesses across the economy. Consequently, this policy note analyzes the impact of ICT jobs, but limits its discussion to secondary sources with the intention of furthering the discussion in future analytical work. Regarding use, this policy note will focus on ICT use in small and medium enterprises (SMEs), given the important role that SMEs play in job creation worldwide.

## 2.2 ICT-enabled work

The second aspect arises from how ICTs as tools are empowering workers by making labor markets more transparent, innovative, and inclusive. ICTs have made it easier for workers to find jobs and for employers to find skilled workers. As ICTs support a trend of increasingly digitized work, they have also enabled innovation in the types of work on offer. Because ICTs have the potential to connect workers to work irrespective of their location, it is possible that they could help overcome the social, cultural, and physical barriers that might otherwise have excluded women or people with disabilities from participating in the labor market. At the same time, there are challenges due to the changes in the ways people work and in the relationship between employers and workers.\*

\* We will discuss these challenges in detail in Section 5.

ICTs are helping workers to find employment. Already, online employment marketplaces are helping some 12 million people worldwide<sup>†</sup> find work by connecting them with employers globally. Some of these marketplaces connect ICT workers with employers worldwide, while others connect workers with employers in local markets, in a mix of jobs that very often are not ICT-related. For example, Souktel's JobMatch in Palestine, allows jobseekers to advertise their skills and connect with potential employers via the mobile phone; jobs matched have included accounting, sales, and IT services.<sup>‡</sup> In India, babajob uses a combination of the Internet and text messaging on the mobile phone to connect workers to a range of jobs—from housekeepers to receptionists to data entry workers.<sup>§</sup>

ICTs have also been creating new forms of work, including microwork—where a larger task is disaggregated into small pieces that are farmed out to a large number of workers, spreading work and income earning opportunities. Another area of emerging opportunity is online contracting—where workers find and do work online, often through Internet-based employment exchanges and platforms. These new forms of work create opportunities for workers who are less-skilled than those employed in ITES/BPO, and who might have limited access to ICT.

These opportunities are global, as ICT networks and tools have proliferated. An online worker in Jakarta, Indonesia has the potential to earn up to ten times the average local minimum wage working as a virtual assistant for an employer in the U.K. or Australia. Job seekers can find and

<sup>†</sup> This is an estimate based on data from oDesk, Elance, and Freelancer. The total does not discount for the same worker registering across multiple platforms.

<sup>‡</sup> Interview with Souktel.

<sup>§</sup> Interview with babajob.com

## connectingtowork/icts\_and\_work

apply for work using mobile telephones or the Internet in places as varied as India, West Bank & Gaza, the US, and the Philippines. And these opportunities are not restricted to ‘traditional’ ICT jobs, or to formal sector employment. The work found can range from carpentry and graphic design to software programming, in both the formal or informal sectors. A maid in India can find her next job that could increase her wages by 20 percent using a mobile phone to connect with an employer. This policy note discusses these and other examples.

### 2.3 Drivers of change

Three global drivers are responsible for the increasing role of ICT in work, and having an increasing influence on jobs and employment: greater connectivity, increasing digitization of the economy, and the globalization of skills.

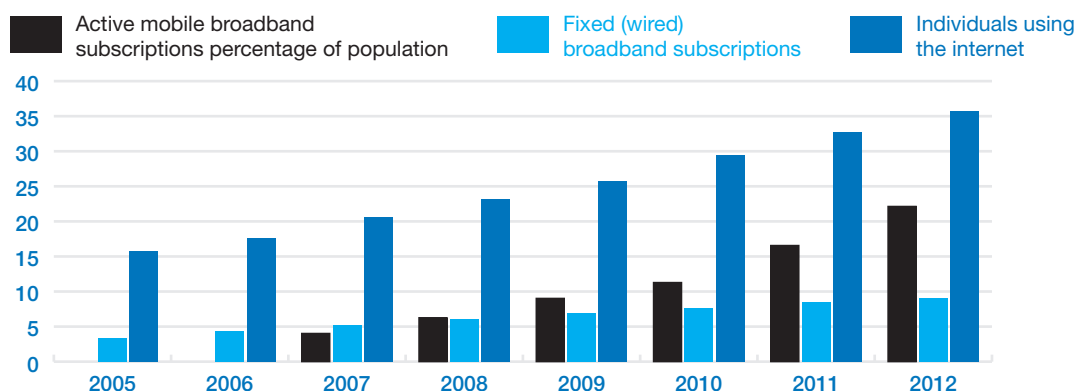
First, the world is ever more connected. Much of the world now uses mobile telephones, and over two billion people worldwide regularly use the Internet. In 2011, 70 countries reported that over half of their populations were Internet users; in low- and middle-income countries, that figure

was 25 percent. Over 120 countries have over 80 percent market penetration of mobile telephones.<sup>7</sup>

This spread of telecommunications, and especially mobile phones and the Internet, means that more of the world can engage in digital work, even as the ICT sector itself is growing. Global telecommunications networks now connect billions of individuals, businesses, and organizations (Figure 1). Much of the world now uses mobile phones. More than three billion people subscribe to mobile telephone services, according to Wireless Intelligence, a market research firm, and there were some six billion mobile subscriptions at the start of 2012.<sup>8</sup>

The International Telecommunication Union (ITU) reports that globally about 2.7 billion people use the Internet, with two-thirds of those users in the developing world.<sup>9</sup> The impact of increasing access has been deepened by falling prices. The global average price of one minute of a mobile telephone call has fallen by 75 percent since 2002.<sup>10</sup> And devices have become cheaper too; personal computer prices, for example, have fallen by over 90 percent since the early 1990s.<sup>11</sup> Smart phones are now available for as little as US\$100 and Wi-Fi-powered tablets for even less.<sup>12</sup>

Figure 1. Global trends in ICT access and use.<sup>13</sup>



The spread of mobile technologies has also connected more people to the Internet. The ITU estimates that there are about 2 billion active mobile broadband subscriptions.<sup>14</sup> The McKinsey Global Institute estimates that the wider use of mobile Internet tools will help improve service delivery and increase productivity for certain types of work, apart from connecting more people to the Internet, especially in the developing world; in doing so, the mobile Internet could generate an annual economic impact of more than \$3.7 trillion by 2025.<sup>15</sup>

The trend of increased connectivity is complemented by the growing use of ICT services and tools in more activities. For example, over half of surveyed SMEs in India use the Internet as a sales channel.<sup>16</sup> Over 60 percent of SMEs surveyed in Latin America used e-advertising as of 2010, although only about 18 percent allowed online transactions (which would be an advanced use of ICT).<sup>17</sup> In OECD countries, more than 95 percent of businesses have an online presence.<sup>18</sup>

A second trend, supported by the first, is that work and indeed, the global economy, is increasingly becoming digital, taking it first to the computer and then, via the Internet, online. Today, telecommuting and outsourcing have become standard business practices globally. The digitization of work has been running in parallel with the growth of the services economy, which is now more than 70 percent of global GDP, and accounts for half of the GDP in even low-income countries.<sup>19</sup>

Work becoming digital has had two important implications: disjoining labor from location; and the disaggregation and sharing of work across space and time. Put another way, much work can now be done online and from anywhere, and one task can now be done by teams that are dispersed

geographically. For example, teams around the world developed the designs for the Boeing 787 online, working collaboratively.<sup>20</sup>

Online collaboration and communication tools have also percolated to individuals and SMEs, and many are free or very low-cost. For example, services such as Skype and Google Hangouts have made global video conferencing free for those connected to the Internet, and collaboration tools such as Google Drive, Basecamp, Adobe Connect and Podio are very robust and either free or inexpensive. These tools are playing a major role in facilitating global work.\*


With more financial transactions also being undertaken online or from mobile phones, it is thus possible for work done and payments made to be entirely electronic. Over US\$15 trillion in payments were processed worldwide in 2011, many of them electronically.<sup>21</sup> Mobile money services could play a larger role in the future. In Kenya, mobile money transactions are already equivalent to more than 20 per cent of that country's annual GDP.<sup>22</sup>

Even manufacturing—which has been seemingly less amenable to digitization—is following these trends. Increasing virtualization is visible in manufacturing with the advent of technologies such as 3D printing<sup>23</sup> and collaborative design and distributed manufacturing,<sup>24</sup> and the increasing use of advanced robotics, data analytics, and automated supply chains in the manufacturing process.<sup>25</sup>

Third, skills demanded have been globalized. Multinational value chains enabled by improving connectivity and by the disaggregation of work have also been enabled by the availability of relevant skills, often at lower costs but comparable quality, globally. Global outsourcing, for example, arose from the availability of talented technical

\* Inputs from oDesk.





*“Multinational value chains enabled by improving connectivity and by the disaggregation of work have also been enabled by the availability of relevant skills, often at lower costs but comparable quality, globally”*

workers in developing countries such as India. It also resulted from the ability of many of these workers to speak and work in English. The language skill is also one reason why the Philippines have become a major outsourcing hub. Similarly, countries such as Egypt have grown their IT-enabled services business—now employing more than 45,000 people—due in part to language skills. As one industry expert explains, “Egypt has 330,000 new graduates every year, with some 31,000 capable of speaking different languages. For example, English is spoken by about 26,000; around 3,000 speak French, while approximately 800 speak German.”<sup>26</sup>

The global skills market and the disaggregation of work have also led to what one group of academics term the “age of hyperspecialization.”<sup>27</sup> To summarize, as the number of workers expands and their access to work opportunities grows, it will be possible for workers to become very highly specialized in particular tasks. Such hyperspecialization can exist only with global scale and high quality in skills development, and will rely on ensuring useful information for workers to align their training and competencies to global market demands.

Such specialization occurs at the individual but also the country level. For example, as A. T. Kearney notes in its assessment of countries’ strengths in IT-enabled services, Latin American countries have a range of skill sets: Brazil in software development and systems integration, Mexico for outsourcing, Chile for R&D and analytics etc.<sup>28</sup> These analyses are evidence of a global network of skills, which enables employers to go beyond their local labor markets and find talent anywhere.

## 2.4 The challenges

The proliferation of ICTs and their increasing role in how and where we work creates opportunities, but also poses new challenges for workers and employers alike. Many analysts have focused on how increased efficiencies due to ICT may lead to job losses, at least in the short term. As ICTs become part of specific economic activities, they will make some skills and jobs redundant. The dislocation of work means that ICTs could and would continue to displace jobs that are easily automated, for example. These jobs will move to lower-cost labor pools, again facilitated by technology.<sup>29</sup>

But other challenges exist as well. As ICT enables new forms of work, it also changes the structure of jobs, the way people develop their careers, and the way they work. Many ICT-enabled jobs are temporary or contract-based, for example, leading to a separation of work from social safety nets such as health insurance or pensions. And where divides in access to ICT, language barriers, or skills deficits exist, workers might lose out on these employment opportunities, limiting peoples’ access to connect to work and find pathways out of poverty. Jobs in the ICT sector, or ICT-enabled employment opportunities elsewhere in the economy, might not have a uniform positive impact everywhere.

This policy note discusses these challenges in Section 5.

## 3. ICT employs workers

As a sector, ICT employs workers globally in ICT jobs. For this policy note, we include in ICT jobs those people who work in the ICT sector as specialists and who are intensive users of ICT.

This section begins with a discussion of employment generated by the ICT sector, including ICT specialists and ICT intensive users. With ICT specialists who produce ICT, we discuss the spill-over effects generated in economies where the ICT sector is active. It is thus useful to note that while the size of the ICT sector itself may vary across countries and may be small in many cases, each country has the possibility of benefiting from ICT jobs.\*

We then discuss the employment effects of the use of ICT, focusing on small & medium sized enterprises (SMEs). Here, as research suggests, the effects are more complex, with the possibility of ICT-intensive users causing increases in labor productivity that may actually cause job losses for others. Furthermore, the advances in technology have created growth areas for the future, such as green ICT and mobile applications, but could also lead to challenges for workers who might be replaced by smarter machines, for example, or see ICTs alter traditional business models.

\* This discussion on the employment impact of ICT as a sector is an initial step in a planned series of knowledge products and hence is more descriptive in nature, and based on existing research and resources. Future work on this topic will expand on the themes outlined here.

### 3.1 Trends and forecasts for ICT jobs

ICT jobs continue to grow. In Europe, for example, employment among ICT practitioners grew by around 3 percent a year, with demand for labor outstripping the supply. The OECD has also found that ICT employment continues to grow, with the top firms hiring more than 14 million people worldwide in 2011, up 6 percent from 2010.<sup>30</sup> Dongier & Sudan find that “the expansion of IT services and ITES . . . industries [has] *created jobs*, raised incomes, and increased exports and GDP.” In India, for example, the IT services and ITES industries “directly employ 2.01 million people in jobs that pay 50 to 100 percent more than comparable service sector jobs.”<sup>31</sup>

The job creating impact of ICT also includes the mobile ecosystem, in associated activities such as mobile applications and content development, as well as in mobile-related service delivery. In the U.S., the mobile app industry provided an estimated 466,000 jobs in 2011 with annual growth rates of up to 45 percent from 2010 to 2011 (TechNet 2012). Safaricom’s M-PESA mobile money transfer system supports 23,000 jobs for agents in Kenya alone.<sup>32</sup>

New techniques and tools also contribute to the increase in the number of ICT jobs. For instance, recent developments in the manipulation of large datasets, so called “big data,” will likely lead to an increase in demand for those skills. Gartner, an IT consultancy, projects that by 2015, big data will generate over 4.4 million jobs worldwide.<sup>33</sup>

The GSM Association, a club of mobile network operators and vendors, estimates that the global mobile industry ecosystem will add 1.3 million jobs up to 2018.<sup>34</sup>

This growth often outpaces the average across the economy. For example, the Philippines' employment in business process outsourcing is expected to increase by 15 percent to 567,000 in 2013. The local industry association reports, Business Process Association of the Philippines (BPAP), reports that jobs growth since 2007 is "at least five times higher than the average employment growth in the country." Incomes are also higher. An entry-level position can have "a basic monthly salary of about P12,000 to P13,000," (around US\$300) which is 38 percent higher than the minimum wage.<sup>35</sup>

Given these effects arising from the growth of the ICT sector and increases in the number of ICT specialists, many governments are keen to develop the industry and expand the use of ICT in their countries. Apart from considering the ways in which the demand for labor could be increased, in the case of ICT employing workers, governments will also need to consider how they will drive the supply of labor, especially as in most developing countries, public education is dominant including at the tertiary level.

Here, the development of a skilled workforce is critical, alongside the creation of a favorable business climate. Hence, ambitions to increase ICT employment need to be put in the context of local enabling systems that would accelerate ICT sector development and the expected subsequent job creation. We will identify and discuss the role of these enabling systems subsequently in Section 6.

There are also possible negative impacts of the greater use of ICTs on employment. Some people might lose their jobs or find their work displaced

due to the introduction of ICTs in their industries and workplaces. We discuss the challenges in Section 5.

## 3.2 ICT production and ICT specialists

Per the OECD's definitions as discussed above, "ICT specialists," include "programmers, software developers but also cable layers,"<sup>36</sup> for whom ICT is the main part of their job—"they develop and put in place the ICT tools for others." For OECD countries, employment in the ICT sector and ICT specialist jobs in other sectors together account for between three and five percent of total employment.<sup>37</sup> Extrapolating from this, we could thus estimate that ICT specialists number 100 million globally, out of the global labor force of 3.4 billion (as of 2011); this contribution varies across countries.

The number of ICT specialists may also seem small in comparison to the global labor force. However, these jobs tend to be better paid, attract highly skilled individuals, and have significant spillover and indirect job creating effects. The rest of this section focuses on these effects.

The first indirect impact is in the multiplying effect that ICT specialists have on their local economies. For example, in India, one job in the IT/BPO industry created up to four indirect jobs.<sup>38</sup> In the Philippines, for example, estimates suggest "that each new job created in IT services and ITES . . . results in two to three new jobs in other sectors . . . as employees consume housing, food, transport, and consumer goods and employers invest in telecommunications, building rentals, water, and other core services."<sup>39</sup> In Latin America, the effect was seen to be 2.4 new jobs in other sectors of the economy for every job in the

## connectingtowork/ict\_employs\_workers

ICT sector.<sup>40</sup> Research on high technology jobs in the U.S., which included a range of ICT related industries,\* found that for each high technology job created, the local economy saw an expansion of four jobs.<sup>41</sup>

Indirect employment is associated with the ICT sector in areas such as application development, content provision, and call center operations. This is a growing area of employment. In some emerging markets, for example “outsourcing of mobile content development can also create significant numbers of indirect jobs. In India alone, the mobile industry is expected to generate around 7 million indirect jobs during 2012.”<sup>42</sup>

While these effects are positive, they are also unevenly distributed across geographies. Many ICT specialist jobs related to software and hardware development are concentrated in a few places, such as Silicon Valley in the US, or in the Republic of Korea, for example. IT enabled services jobs are more distributed, even though that work is also dominated by a few countries such as India, Mexico, and the Philippines.

However, other countries are also entering the fray. Armenia, for example, has an ICT sector that is creating jobs, with many jobs going to women. Employment in the ICT sector in 2010 included 5,000 professionals, and the average monthly salary of ICT specialists was 4-5 times higher than average salary levels.<sup>43</sup> In ITES, Egypt has

actively promoted itself as a low-cost destination for call centers and ranks fourth in the world in the Global Services Location Index for 2011, developed by A.T. Kearney, a consultancy. Similarly, in Africa, four countries find mention among the top 50 locations in the index: Ghana (27), Senegal (29), Mauritius (36) and South Africa (45).<sup>44</sup>

And even though much attention is focused on job creation challenges, another simultaneous challenge is that globally, skills gaps are widening. For example, in Europe, there is a projected shortfall of up to 900,000 ICT professionals by 2015, exacerbated by a decline in computing science graduates.<sup>45</sup> The McKinsey Global Institute predicts that by 2020 “there will be [a] 38 million-40 million potential shortage of college-educated workers.”<sup>46</sup>

Governments thus have the opportunity, at least in some cases, to create additional employment in ICT production. They will need to ensure that they are able to attract and sustain investments and participation in the ICT sector, and simultaneously ensure the availability of a local talent pool. Such locational readiness has been discussed elsewhere.<sup>47</sup> This policy note will also turn to that discussion subsequently.

### 3.3 The use of ICT: The case of SMEs

Apart from their production, ICTs have an impact on job creation and displacement through their use. The scope of these impacts is almost universal. No sector or country is untouched by ICT. This has implications for productivity of firms and labor, creating a complex set of interactions that have varying implications for employment.

The effect is global, but it is uneven, with

\*This research included the following ‘high-technology’ industries: pharmaceutical and medicine manufacturing, computer and peripheral equipment manufacturing, communications equipment manufacturing, semiconductor and other electronic component manufacturing, navigational, measuring, electromedical, and control instruments manufacturing, aerospace product and parts manufacturing, software publishers, internet publishing and broadcasting, other telecommunications, internet service providers and web search portals, data processing, hosting, and related services, architectural, engineering, and related services, computer systems design and related services, scientific research-and-development services.



varying gains and losses. The World Economic Forum estimates that in 2011, the penetration of digital services (digitization) contributed US\$193 billion to the global economy and created 6 million jobs. But the effect of this process is uneven in various countries. Developed countries see most of the value of “digitization” effects in increases in productivity and growth. Emerging economies, however, see the increase in the number of jobs created by ICT. Regions of East Asia, South Asia and Latin America created the most number of jobs in the digitized environment; 4 million jobs were generated in 2011 in these parts of the world. For OECD countries, the Forum suggests that increased digitization will lead to job losses, but increases in productivity.<sup>48</sup>

Here we focus on how the use of ICTs by SMEs has influenced employment. We focus on SMEs due to their critical role in job creation broadly, and find that ICT could play a positive role in enabling job creation at SMEs.

### 3.3.1 The role of SMEs in job creation

SMEs are essential sources of jobs and innovation, contributing to overall economic growth. For example, in the European Union, 23 million SMEs provide around 75 million jobs and represent 99 percent of all enterprises.<sup>49</sup> In the United States, startups create on average 3 million jobs annually while existing firms lose 1 million net jobs per year.<sup>50</sup>

From the job creation side, even during the economic recession, job creation at startups has remained stable while existing firms tend to be highly sensitive to the business cycle.<sup>51</sup>

In developing countries, SMEs and startups are increasingly becoming drivers of job creation and local innovation. A recent survey conducted with over 8,000 entrepreneurs in 35 countries across

the Americas, Europe and Asia Pacific, revealed that on average entrepreneurs expanded their workforce by 16 percent in 2011 and that they anticipate creating more jobs in the coming years. Among those employers, 44 percent expect to expand their workforce abroad.<sup>52</sup>

### 3.3.2 The impact on SMEs

SMEs could employ both ICT specialists and ICT-intensive users, depending on their products and services.

The continuous growth of ICT has transformed SMEs by facilitating their access to global markets, clients, and consumers, by increasing productivity, and increasing the efficiency of business operations. In Europe, SMEs that adopted the Internet were found to grow faster.<sup>53</sup>

ICT has also facilitated entrepreneurship by lowering initial investment requirements and permitting access to scale markets. For example, SMEs that sell their products on Etsy, an e-commerce website for handmade and vintage items, immediately get access to 60 million visitors every month.<sup>54</sup> Those participating on Alibaba.com, an e-commerce website for business-to-business transactions, have access to 37 million users from 240 countries.<sup>55</sup> The Internet allows unprecedented access to global markets. It also has implications for SME growth, and related employment opportunities.

Enhanced use of ICT by firms has proven to reduce transaction costs and improve productivity and growth. One World Bank study found that firms that use ICT grow faster, invest more and are more productive and profitable, with sales growth and profitability reaching 3.4 and 5.1 percentage points higher, respectively, compared to firms that do not use ICT.<sup>56</sup> Some argue that increased productivity without growth in their

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outputs delivers increased competitiveness but fewer jobs.<sup>57</sup> While productivity growth remains important, it is no longer sufficient. There is a need for SMEs to grow their revenues by leveraging innovative ICT solutions, particularly for increasing access to global and local markets.

Other studies find that those SMEs that are investing in Web technologies such as e-mail, web sites, cloud-computing, and e-business solutions are the ones growing the fastest. SMEs that spend more than 30 percent of their budget on Web technologies grow their revenue nine times as fast as SMEs spending less than 10 percent.<sup>58</sup>

Now, the rapid diffusion of broadband and mobile technologies is enabling these businesses to expand by gaining access to global markets and expertise without large investments in infrastructure to reach scale. In this process, a major role is being played by innovative applications such as Amazon's Web Service, Google Apps for Business, Facebook, Skype, and Twitter, which have built new foundations for successful ICT-enabled businesses globally.

Online platforms also create entrepreneurship opportunities for those who are at the bottom of the pyramid (BOP, see Box A).

### Box A. ICT supports entrepreneurship opportunities at the bottom of the pyramid

Kopernik, a nonprofit funded in 2010 delivering simple, affordable, and innovative technologies like water filters and solar lanterns to poor communities living at the BOP, connects producers of innovative technologies, communities that need them, and donors, through an online marketplace facilitating the movement of money, technology, and information to improve the lives of the poor. In one of their projects, funded by ExxonMobil, women in Bojonegoro in East Java became technology agents to sell products to their community. Starting from participating in "tech fairs" held in a number of villages to introduce various technologies, the women then formed groups, each identifying a coordinator and treasurer, to sell the technologies at an appropriate price to relatives, friends and neighbors in their villages. Today the cooperative has more than 40 members and is becoming well-known in the local area. They are often invited by the local government to represent the community in Bojonegoro at public events. Their core activity has been selling Nazava water filters, which are purchased at US\$14 and sold at US\$19 in cash or US\$21 in three installments. The women have sold water filters to more than 20 villages in Bojonegoro – greatly expanding access to safe, clean drinking water in the area.

*Source: Authors, Interview with Kopernik (April, 2013).*

### 3.3.3 The impact on job creation

Some research finds that ICT use by SMEs has positive implications for job creation. Research done in eight EU member states found, around 70% of job vacancies for ICT professionals are found in SMEs.<sup>59</sup>

OECD research has also found that SMEs that were more technology intensive tended to grow faster. This is not limited to SMEs in the ICT sector, but includes SMEs across the economy who can innovate, link with markets using technology, and hence, grow quickly.<sup>60</sup> It is possible to deduce that there would be positive employment effects from such growth.

The McKinsey Global Institute finds that SMEs that use the Internet tend to create 2.6 jobs for every job displaced.<sup>61</sup> The effect was even more pronounced in developing countries, where the ratio was 3.2 jobs created for every job displaced by the Internet.<sup>62</sup> Indeed, this survey of more than 4,800 SMEs found that SMEs that integrated the Internet into their businesses created twice as many jobs as the average.<sup>63</sup> This is for SMEs that operate in the ICT sector and across other sectors as well, which underscores the potential benefits of ICT for job creation in the whole economy.

One must remember that adopting ICTs alone will not address fundamental (external) concerns that might otherwise prevent SMEs from growing, including a weak business climate, a limited talent pool, or limited access to finance. These factors need to be taken together—SMEs that grow can invest in people and in technology. We address these issues in Section 6.

## 3.4 New avenues for job creation

New systems and services, many of which are ICT-enabled, also hold the potential for job creation. Here, we focus on three possibilities: green technologies, mobile applications, and cloud computing and big data. We also discuss an emerging technical breakthrough—smart machines—that could have implications for employment.

### 3.4.1 Green technologies

Another area showing potential for ICT-enabled job creation is green growth. One OECD report proposes that promoting ICT skills in the green and smart economies pays a double dividend by encouraging job creation and accelerating the transition to green growth.<sup>64</sup> These jobs vary from protecting the environment and reducing the harmful effects human activity has on it (mitigation), to helping to better cope with current climate change conditions (adaptation).<sup>65</sup>

In particular, additional job growth in ICT is expected to come from the demand across sectors for developing customized “smart” applications such as “smart” grids, “smart” transport systems and “smart” buildings. “Smart” applications rely directly on ICTs, and the availability of ICT skills is crucial for meeting the demand and for achieving the aims of many of these policies. For example, estimates have suggested that deployment of “smart” grids could create approximately 280,000 new jobs by 2012 in the United States.<sup>66</sup> There will also be a surge in induced job creation related to installing and maintaining systems that smart buildings use to control lighting and temperature. Given the role of digital technologies in these systems, ICT-skilled workers will be in demand here too.

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“Smart” solutions for cities, to build resilience and respond effectively to natural disasters, will give rise to new business/job opportunities. There will be need for ICT infrastructure (e.g., data centers) and services to store, process, and analyze the massive amount of information captured from various sensor networks, observation systems, and mobile networks to develop systems for all stages of disaster risk management, including early warning systems, emergency coordination, and recovery. For example, in Japan, the government has implemented a coordinated data distribution project for the monitoring of radiation, where SIM-enabled devices located in farmlands, parks, offices, and danger and evacuation zones use mobile networks to transmit measures of radiation.<sup>67</sup> These opportunities are not limited to large corporations but also impact a growing market for SMEs, entrepreneurs, and individual software developers.

Finally, jobs will be created in greening the ICT sector itself. For example, server consolidation by providing “cloud computing” services across sectors is expected to enable further efficiency by increasing utilization rates and reducing energy required for power and cooling. Workers will also be needed to support these data centers and other ICT infrastructures that are vital enablers of smart solutions that would enable energy efficiency in other sectors.

Governments that drive green growth strategies will require people capable of both greening ICT itself and helping ICT to make other activities greener. Additionally, there will be increasing demand for ICT skills to reduce vulnerabilities and build resilience to the impacts of climate change.

### 3.4.2 Mobile applications

ICT SMEs are also benefiting from innovation in the use of IT-based and wireless technologies. The growing penetration of the mobile telephone all over the world, and the development of the mobile phone applications industry have also created an opportunity for entrepreneurs and SMEs to enter the market with ease. These mobile application developers are able to access large markets quickly.

A company that publishes an application on the Apple app store, for example, gains access to some 500 million app store account holders.<sup>68</sup> Similarly, developers who publish to the Google Play app store get access to over 900 million activated Android devices worldwide.<sup>69</sup> These developments have significant possible employment impacts. In the United States, the mobile application industry provided an estimated 466,000 jobs in 2011 with annual growth rates of up to 45 percent from 2010 to 2011.<sup>70</sup>

### 3.4.3 Cloud computing and big data

Cloud computing shifts computing resources to the network and allows users to access large scale hardware or software resources quickly and cheaply. Cloud computing has allowed companies to focus less on securing and managing IT resources, and use existing platforms to develop and deploy their services and products. This has allowed some companies to start up faster, focus on their core operations, but also reduce the number of employees who might otherwise have managed IT systems. Hence, even as cloud computing has helped start up more ICT SMEs, for example, it might have also reduced the size of those startups. The projections are that cloud computing will create jobs, but also create skills gaps.<sup>71</sup>

Cloud systems, combined with increasingly dispersed sensors and the digitization of business and social transactions, have also spawned interest in 'big data.' Big data refers to the collection, management, and manipulation of very large data sets to support decision making and derive new insights. For example, firms can now use these technologies to analyze millions of trades on stock exchanges, data on credit card transactions, or stores' shopping records, to detect patterns, identify opportunities for efficiency enhancements, or even synthesize predictions about behavior. Again, estimates suggest that big data techniques could create more jobs than there would be skilled professionals to fill them.<sup>72</sup>

#### **3.4.4 Smart machines: A future possibility**

Many organizations and academics have attempted to predict how technology will shape the future of work. The Apollo Research Institute and the Institute for the Future propose in a report about work skills in 2030 that, "global connectivity, smart machines, and new media are just some of the drivers reshaping how we think about work, what constitutes work, and the skills we will need to be productive contributors in the future."<sup>73</sup> Here, we focus on the emerging trend for smarter technologies to both potentially replace but also enhance human workers.

As computing power increases and telecommunications networks expand, machines are able to learn and do more. For example, Google is already testing self-driving cars in California, and the Apple iPhone's Siri, which responds to natural voice commands, could challenge call centers in finding information.

As such systems proliferate and improve, MIT's Erik Brynjolfsson and Andrew McAfee suggest that more structured service jobs might be lost. At the same time, these advances could empower workers who "race with the machines," and learn to use these technologies in their work. For example, IBM's Watson computer, which has battled chess and trivia champions, is now part of a decision-support application for oncologists.

Such examples of working together will increase, creating demands for new skills among workers to be able to manipulate and use machine intelligence to supplement creative and complex tasks.<sup>74</sup> Although this is a futuristic possibility, it is nevertheless useful to consider given that machines will likely replace low-skill or easily automated mid-level skill jobs. With many of those jobs flowing to the developing world from the more advanced economies, governments will need to keep track of these technologies and ensure that their workforce is ready for the future.



## 4. ICT empowers workers

ICTs also empower workers—including those who are not ICT specialists or advanced intensive workers—in three ways. First, they make labor markets more transparent, especially in how people find work in local or global markets. Second, ICTs enable innovation in labor markets by introducing and supporting new forms of work. And third, in some cases, even traditionally marginalized groups (e.g., people with disabilities, women), and the poorest people with limited skills and access to technology might be able to participate in labor markets. This section documents and analyzes these three emerging opportunities.

### 4.1 Making labor markets more transparent and efficient

Finding employment generally begins with some kind of job search. Job searchers have traditionally relied on their familial or other social networks. But labor markets are not always transparent, and job searches may be inefficient, with information gaps preventing potential employers and skilled employees from connecting with each other. ICT has the potential to make labor markets more transparent and efficient. The greater use of technology in job searches—long dependent on public funding—has also coincided with the increasing private provision of this service.<sup>75</sup>

There is a range of online job search tools, accessed via the Internet, that have become popular worldwide. Now, a new set of job search tools that use mobile technologies apart from Internet interfaces have the potential of reaching even those

who are not connected to the Internet. And greater impact is possible. Vodafone, a global mobile telecommunications company, estimates that job finding services that use mobile phones to connect seasonal and informal workers to employers could attract 49 million users, create successful connections to 12 million jobs, and provide an annual livelihood benefit of over \$5 billion up to 2020.<sup>76</sup>

Recent evidence from Sri Lanka, for example, suggests that up to 8 percent of jobs are found through mobile or Internet-based listings, even among low-income populations (Table 1).

**Table 1. Job search techniques in Sri Lanka\***

Job search technique	Female (%)	Male (%)
Through mobile/Internet	7.7	8.0
Through private employment agency	0.4	0.7
Through university/school career office	5.6	1.7
Through social network (friends/relatives)	35.6	43.0
Employer contacted you	4.4	8.0
Contacted employer directly	5.8	9.2
Started own business	36.0	25.1
Job obtained after training/apprentices	2.6	2.8
Inheriting a business	0.4	1.3
By the government	1.4	0.3

\* Author's calculation using data from the Skills Toward Employment and Productivity (STEP) Skills Measurement Survey 2012, in Sri Lanka. In this case, at least, it is useful to note that the use of ICT does not appear to vary much by gender.

Similar results are found elsewhere. A 2010 survey of employers in Pakistan's Sindh province found that some 14 percent surveyed reported using the Internet to fill jobs. Notably, 90 percent of employers surveyed were SMEs.<sup>77</sup>

Such tools, which use mobile and Internet interfaces, also serve non-ICT and informal workers. One example is babajob, an India-based service that connects job seekers to employers especially in the informal sector using a mix of mobile and Internet based tools. Founded in 2007 in Bangalore, babajob has half a million registered job-seekers and some 60,000 employers offering positions for jobs ranging from cooks, maids, chauffeurs, and data entry workers, to office staff. babajob reports that those finding positions on the system have an average 20 percent higher wage than before. babajob segments its user base into the unconnected poor (living on less than about US\$55 a month) and the middle-class job seekers that earn more.<sup>78</sup>

Another approach is offered by the start-up Duma, based in Nakuru, Kenya. Created in 2012, Duma is an SMS-based service that matches people to job openings and companies to qualified employees based on their social network, skills, and geographic location. It is intended, in particular, for short-term tasks (e.g., for marketing, or event organization) where a group of people need to be recruited quickly. Duma works with a geographically tagged database of potential employees, especially students, and then uses social networks to build up the group to match the employers' requirements. Duma has over 1,500 workers in its database and has matched over 350 workers to jobs in December 2012.<sup>79</sup> Other examples of job search tools are discussed in Box B.

These tools face a range of challenges, however, including ensuring financial sustainability, a

steady flow of jobs, and creating a reputation of trust and credibility.<sup>80</sup> Even if they are private efforts, having the enablers in place will help ensure their long-term sustainability.

## 4.2 Making labor markets more innovative

ICT supports innovations that have created new forms of employment and work. These could also help in increasing the number of available jobs. Some of this has been underway for some time. As this policy note discusses earlier, outsourcing activities have become a major jobs creator in some countries. Outsourcing directly employs over 3.4 million people across Egypt, India, and the Philippines, for example. Now, newer approaches to work have the potential to create more jobs.

These new types of work—like outsourcing—rely on ICT to increase access to global employment and income generation opportunities. Such online work generally exploits wage differences across geographies, or consists of tasks that machines cannot perform effectively or efficiently without human intervention. Here, we focus on two innovations. The first is online contracting, which may be defined as a retail form of outsourcing. This allows not only larger firms, but also individuals and SMEs to connect with workers globally who complete tasks via online interfaces. Online contracting today mostly digitizes existing types of work, and unsurprisingly, much of it is ICT-related work. However, as we will discuss below, a significant portion of online contracting is for non-ICT work.

Microwork is another new form of work that has become possible because of the ability of ICT to coordinate work across geographically dispersed

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### Box B. Finding jobs

A number of services connect job seekers with work, using a combination of mobile and Internet tools. Souktel serves six countries in the Middle East and Africa, targeting students, BOP communities, and marginalized communities depending on the country. It claims to have reduced the average time to search a job from 12 weeks to just one week in the West Bank and Gaza. Other services include Assured Labor, which operates in Brazil, Nicaragua, and Mexico; LabourNet in India; and M-Kazi in Kenya. The value propositions for these services are summarized in the table below.

**Table: Value proposition for mobile job-search and job-matching services**

Target Audience	Value Propositions
Employers	<ul style="list-style-type: none"> <li>• More qualified candidates can be hired through increasing the candidate pool, by expanding a recruiting channel from traditional newspaper or radio advertisements to mobile phone users</li> <li>• Reduce recruiting cost by switching the recruiting channel from a manpower agency</li> <li>• Reduce recruiting time by receiving candidates' latest information on a real-time basis</li> <li>• Ability to hire people for entry level and low-skill level job, which is sometimes difficult to conduct with existing recruiting services</li> <li>• Increased hiring efficiency due to automatic match filtering that only lets those qualified "see" the job posting, thus reducing applicant volume and increasing applicant quality</li> </ul>
Job Seekers	<ul style="list-style-type: none"> <li>• Reduce time and cost for registering their profile to find a job, which have been previously done through manpower agency, website, or paying someone to professionally create their CV</li> <li>• Reduce time and cost for job search by cutting a travel cost from rural to urban area and receiving job matching information via mobile phone</li> <li>• Increase the chance of employment through getting access to more job openings information in a quick and cost-efficient manner, and receiving advice, training, and services to make their work experience and skills look more professional and attractive to employers</li> <li>• Potential increase of income by accessing a better job</li> </ul>

individuals. Microwork implies dividing a larger task into smaller “microtasks,” farming those tasks out to workers, and then re-aggregating them to derive the final output.

The main motivations for employers to use these services are cost savings, reduction of hiring time, access to talent, and flexibility to scale up and down. Online contracting and microwork brings the work to the worker rather than the worker to the work, and allows companies to access global labor pools in a flexible way.

#### 4.2.1 Online contracting

It is possible today for an individual or company to hire qualified workers via online employment marketplaces. These marketplaces go beyond simple job search/matching functionalities, however. They include detailed assessments of the workers’ (and employers’) performance and quality, measures of competency, often including tools to monitor workers as they work, and including payment systems and dispute resolution mechanisms. In some cases, these online contracting systems provide training and some basic services (e.g., health insurance) for workers.

Online contracting differs from traditional outsourcing as it is not structured around long-term and large volume arrangements. Rather, when smaller employers such as SMEs or individuals need support in some task or project, these services offer an efficient means to find, recruit, manage, and pay qualified individuals to perform those tasks.

Some of the more popular services include oDesk and Elance. In 2012, about 2.5 million jobs were posted on these services, for tasks ranging from writing to customer service to software development. Information technology (IT) jobs form the majority of those posted on these virtual

marketplaces. However, jobs in other areas, such as graphic design, animation, music, writing, and even legal services, are also growing. For example, as of July 2013, about half of the jobs on oDesk were non-technology related.<sup>81</sup> Elance similarly estimates that creative skills are most demanded (40 percent), followed by IT & programming (39 percent).<sup>81</sup>

These opportunities are global. Even countries with limited Internet use such as Papua New Guinea (where only 2 percent of the population use the Internet), have had workers participate using oDesk.<sup>82</sup> But the types of work vary by country, reflecting different skills and variations in costs, as displayed in Table 1. This suggests the variation in competencies and skills while suggesting that the role of ICT in creating global labor pools might not have a unilateral effect—there might not be a uniform shift of jobs to other locations.

**Table 1. Examples of the types of tasks on oDesk<sup>83</sup>**

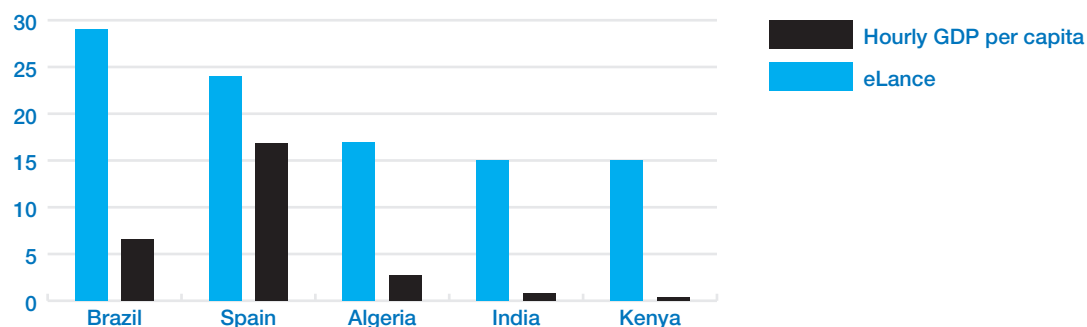
Type of task	U.S. workers %	Pakistan workers %
Blog & article writing	14	7
Web programming	7	14
Graphic design	4	7
Data entry	4	7

Elance data also show that online workers on their site tend to earn significantly more than national averages, represented as GDP per capita per work hour (Figure 2). In line with expectations that global labor markets will smooth out divergences in wages, the average hourly rates of online workers also show a smaller variation

\* Author’s analysis based on information from oDesk.com.

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Figure 2. Comparing hourly wages: Online (on Elance) versus national averages\*



\* Authors, based on Elance Trends: <https://www.elance.com/trends/talent-available>.

by geography. Incomes also tend to increase for these workers. Anecdotal reports suggest that some workers even see increases in their hourly rates of up to ten times in about two years.

The results suggest global impact. In 2012, oDesk had freelancers from 179 countries work 35 million hours and earn \$360 million on that platform. Nearly 2 out of 3 online workers generate at least half of their family's income on oDesk, and more than 40 percent of workers in emerging economies say that oDesk work accounts for most or all of their family income.\* Similarly, 48 percent of Elance workers report that online work is their main source of income.<sup>84</sup>

The size of online contracting is significant. Elance projects that the market is US\$1 trillion globally.<sup>†</sup> Worker earnings grew more than 20 times from 2007 to 2011 to reach US\$225 million.<sup>85</sup> Freelancer, another service, has enabled over 4.5 million projects, with a value of over US\$1.1 billion.<sup>‡</sup>

\* Information provided by oDesk.

† Interview with Elance.

‡ Information from Freelancer: <http://www.freelancer.com/>

The sources of work have been concentrated in developed countries, but employers in developing countries are now becoming more active. For example, employers from India now represent nine percent of all jobs posted on the Freelancer.com. This makes India the third largest country by employers after the U.S. and the United Kingdom. And workers in the U.S. are hired by Indian contractors 3.2 percent of the time.<sup>86</sup>

Many of the workers using Elance and oDesk are highly qualified and may even have full time employment, supplementing their incomes through these avenues. Of the workers who use Elance, for example, 42 percent have a Bachelor's degree and 24 percent have a Master's degree.§ A third of them are employed either full- or part-time.<sup>87</sup>

As people face difficulties in finding work in their own economies, yet seek to live there, online contracting could thus prove to be a boon, enabling counter cyclical income earning opportunities. And these trends could have a multiplying effect; these platforms have begun to see some

§ Interview with Elance.



individuals beginning to hire others through the same platforms to assist them in their work, some even setting up virtual SMEs.<sup>88</sup> For example, 42 percent of Elance freelancers plan to hire other freelancers in 2013.<sup>‡</sup>

#### 4.2.2 Microwork

Microwork has also generated significant opportunities for many workers worldwide.<sup>\*\*</sup> Workers access these opportunities via online platforms (some with mobile interfaces) that provide employers with access to a global labor pool. These platforms break down large pieces of business processes into discrete tasks of limited sizes, and distribute them to workers across geographic boundaries. Examples of microwork include market research, data input, sentiment analysis, data verification, copywriting, graphic design, translation, and even software testing.<sup>89</sup> One case study of how microwork has been used in a corporate setting is in Box C.

There has been rapid growth in the number of microwork aggregators and microworkers from various parts of the world. The aggregators include Amazon Mechanical Turk (AMT), CloudFactory, MobileWorks, Samasource, Servio, ShortTask, and Clickworker, who outsource microwork to anonymous users and provide supplementary income to global virtual workers.

Gaming platforms are also one of the

aggregators that can outsource small tasks, utilizing virtual currency as rewards. For instance, CrowdFlower, a platform that outsources tasks to groups to solve problems ranging from product categorization to business lead verification, outsourced half of its tasks in 2009 through online gaming channels and paid for them with virtual cash, according to the company.<sup>90</sup>

The global market size for microwork cannot be easily estimated given its nascent state and fragmentation. However, analysts suggest that the market size is about \$1 billion today, and could grow to about \$5 billion within another 5 years. The average revenue of aggregators, although from limited sources, seems to range from \$60 million to \$300 million.<sup>††</sup>

Some platforms provide a matching service, and even additional services such as tools and training for microworkers, and mechanisms for quality control. For example, CloudFactory organizes microworkers into solidarity groups to support peer-to-peer learning and training. This allows CloudFactory to leverage a reproducible approach and social capital for operational effectiveness and microworker development. As a quality control, CloudFactory assigns the same task to several people to ensure quality.<sup>91</sup>

Samasource positions itself in the middle of the supply chain and manages separate relationships with customers and delivery centers. Full-time workers around the world access SamaHub, a proprietary online work distribution system, from delivery centers monitored by Samasource staff. Account managers and quality assurance professionals ensure task quality, accuracy, and turnaround time<sup>92</sup>

Probably the most widely known microwork platform is Amazon Mechanical Turk (AMT),

<sup>‡</sup> Input from Elance, May 2013.

<sup>\*\*</sup> Online contracting and microwork are typically differentiated by the size and sophistication of the tasks to be completed. Online contracting involves typically larger, more creative projects (creating a market research report, a software program, a power-point presentation); and can be "outsourced" abroad to specific, mostly individual professionals with specific skills. Microwork tasks are typically much smaller in size, which allows for significantly higher integration in automated workflows and quality management. However, the boundary between these two forms of online work is blurring (e.g., in the case of logo and graphic design, or in the case of logistical services).

<sup>††</sup> Interview with Panos Ipeirotis.

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### Box C. Microwork in the corporate world: A case study

CastingWords is an online, ICT-enabled transcription service that uses the Amazon Mechanical Turk (AMT) platform to transcribe speech into text rapidly. AMT takes a 10 percent commission for use of its platform. Anyone interested in using the transcription service sends an audio file to CastingWords, which then breaks the file up into smaller pieces and farms it out to transcriber microworkers. Those microworkers listen to these pieces of audio and send back the transcription, which is automatically reformed into one file.

The service is being used by many large organizations including the Wall Street Journal, the BBC, and NASA. It costs between \$1 to \$2.50 per minute of audio, based on turnaround time desired and the expertise of the microworker doing the transcription.

*Sources: Authors based on <http://www.topcoder.com/wp-content/uploads/2011/09/Hyperspecialization.pdf>; <https://castingwords.com/support/about-us.html>; <http://www.nytimes.com/2006/04/05/technology/techspecial4/05lego.html?ex=1301889600&en=9294046d7c3d82ca&ei=5090&partner=rssuserland&emc=rsstechspecial4/05lego.html?ex=1301889600&en=9294046d7c3d82ca&ei=5090&partner=rssuserland&emc=rss>*

which emerged from Amazon, the world's largest online retailer. AMT is estimated to have 500,000 microworkers in 190 countries. The service enables companies to access a diverse, on-demand workforce, assign tasks needing human intelligence, and then programmatically integrate the results of that work into their business processes and systems. Developers can leverage this service to build human intelligence directly into their applications. Examples of such tasks include photo recognition and audio transcription.

Studies found that 47 percent of AMT workers live in the United States, 34 percent in India, and 20 percent in other countries. Workers' objectives for participation differ, however; AMT microworkers from India are more likely to perform microwork as a primary source of income as

compared to those from the United States.<sup>93</sup> For workers, the main motivations to take up these opportunities are the flexibility of this work and the supplemental/discretionary income opportunity. Most AMT workers earn between \$10,000 and \$20,000 annually.

The majority of online workers are relatively highly skilled with university degrees and about 20–35 years of age. Some aggregators, such as Samasource and CloudFactory target lower-skilled communities and provide sufficient training and facilities for workers to participate. Some MobileWorks workers are semi-educated homemakers. Various aggregators target different types of work and it is possible for microworkers to transition from low-skilled work to higher-end skilled work and thereby earn more.

### 4.2.3 Challenges

Key disadvantages of online work are that these jobs do not bring job security, and may lead to volatile, even low incomes. Critiques of microwork, especially, propose that the work may be routine, trivial, or with little scope for skills development. Some of the platforms are addressing these challenges by incorporating training, building up communities of workers, and incorporating feedback mechanisms to reward workers.

Another concern for online work is that many workers may not be able to participate due to their lack of global language skills. Much of the Internet and international business uses English, for example. Online workers with poor skills in English or other global languages might face difficulty in accessing these opportunities, and in competing with other language-equipped workers.

These services also face some challenges. Skills may be mismatched, especially given the lack of standardized job descriptions and competency qualifications. Some employers also face challenges in quality control due to the difficulty in managing remote teams for complex tasks.

## 4.3 Making labor markets more inclusive

ICTs are also helping make labor markets more inclusive by opening up employment opportunities for people who might have been traditionally unable to access work due to geographic, physical, or social barriers. In this section, we will focus on how ICT has been playing a role in including more people in labor markets, with a focus on women, people with disabilities, and workers at the BOP.

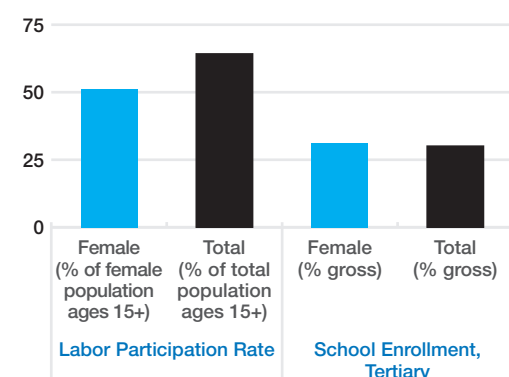
### 4.3.1 Connecting women to work

ICTs have shown potential in connecting more women to work, and could improve access for people with disabilities to work as well. ICT could thus help in overcoming at least part of the social and logistical barriers that often prevent these communities from participating in labor markets.

Many countries have significant numbers of women who are unable to participate in the labor force due to a mix of social or cultural reasons, constraining the availability of labor. In some countries women might also have unequal access to education and then to job opportunities. Worldwide, labor participation is only 51 percent of females (aged 15 years and above), compared with an overall rate of 64 percent.<sup>94</sup>

This discrepancy matters because increasing the participation of women in labor markets would empower women through the income earned and social status attained. It could also increase the supply of skilled labor; the enrollment of females in tertiary education worldwide is on a par with the total (see Figure 3). Improving access to good jobs and decent work for women has significant social spillovers.<sup>95</sup>

**Figure 3. Labor participation and tertiary school enrollment<sup>96</sup>**



## connectingtowork/ict\_empowers\_workers

A survey of women in technology by Elance found that a large share of online workers who are women see online work as a way to earn an income while spending more time with family. At the same time, about a third of respondents felt that one of the reasons fewer women entered technology-related careers was because there were fewer local opportunities—something that online work could help address.<sup>97</sup> At the same time, on oDesk, for example, 39 percent of workers are female, which is higher than the global average of women in white collar/computer-based jobs.\*

This potential is underscored by available data, even if the results are location-specific. For instance, 41 percent of workers on Elance are female, whereas AMT has more female workers in the US. The concept of “homeshoring”, where people work for a virtual organization or call-center from their homes, also opens up opportunities for women who might choose to stay at home rather than work in a traditional job.<sup>98</sup> jetBlue, a U.S. based airline, has a virtual call center of more than a thousand workers, many of whom are women, connecting to the airline’s systems over the Internet using home computers.<sup>99</sup> The BPO industry has also benefited women. According to a 2010 survey in the Philippines, women constituted more than half (54.9 percent) of the industry’s total workforce.<sup>100</sup>

In Saudi Arabia, Glowork has also used ICT to match women with employers, reducing search costs and addressing cultural concerns. Glowork operates an online platform that connects workers and employers, and then serves as means to enable employees’ working from their homes. As of 2012, Glowork has successfully placed about 6,000 women.<sup>101</sup>

Over time, more women might find and

connect to work using ICT. Unfortunately, one of the main barriers to realizing this potential is the limited access women have to ICT. This is true in higher-income countries as well as in poorer countries.<sup>102</sup> It is thus essential for efforts to overcome the digital divide to include and address gender divides in access to ICT.

### 4.3.2 Connecting people with disabilities to work

ICTs are also transformational in including people with disabilities in the labor market. Simple technologies that have become commonplace—video conferencing, voice recognition and text-to-speech conversion, and telework—can allow people with disabilities to access education and training opportunities, and then find and do work.

The flexibility that ICT enables in terms of the location of work, the variety of interfaces, and means of interaction all allow people with different physical, cognitive, and sensory disabilities to participate in mainstream work, including work that might be virtual. Hence, even though ICTs alone will not address all of the barriers to employment for people with disabilities, they can help open new possibilities.

ICT also opens the possibility of disjoining labor from location, and with the virtualization of work, people with disabilities who might not be able to otherwise access work due to logistical challenges may be able to work online. Some examples already exist. Box D discusses the concept of impact sourcing, and organizations such as Digital Divide Data, in Cambodia, have included people with disabilities in their programs.<sup>103</sup>

However, challenges remain. People with disabilities are often less likely to have access to education and training programs that would make them competitive in labor markets.

\* Information provided by oDesk.

### Box D. Impact sourcing: Combining global outsourcing with social impact



As the outsourcing business has grown globally, a mix of companies and intermediaries are beginning to consider if social impacts might be multiplied. The outcome is impact sourcing, which as Accenture, a consultancy defines it, is “outsourcing that benefits disadvantaged individuals in low employment areas.” Accenture finds that impact sourcing helps increase employees’ incomes between 40 percent and 200 percent. Estimates suggest that impact sourcing could account for about a tenth of the global BPO market.

Many examples of ongoing impact sourcing exist. One example is Digital Data Divide (DDD), which aims to create jobs for young people in emerging economies. DDD workers check data integrity, analyze and digitize databases, documents, publications and archives. Workers include people who are poor, who have disabilities, or are otherwise excluded from employment. DDD recruits and trains employees, supporting further education, even as they work in the outsourcing industry in centers in Kenya, Cambodia, and Lao PDR. In some cases, workers who “graduate” from DDD earn more than four times the average wage.

Impact sourcing thus combines the global nature of the outsourcing industry with the advantages that ICT offers to overcome exclusion.

*Source: Authors, based on Gib Bulloch and Jessica Long, Exploring the Value Proposition for Impact Sourcing: The Buyer's Perspective, Accenture, 2012: <http://www.accenture.com/us-en/Pages/insight-exploring-value-proposition-impact-sourcing.aspx>; The Rockefeller Foundation, Impact Sourcing: An Emerging Path to Sustainable Job Creation? December 2011: <http://www.rockefellerfoundation.org/uploads/files/509cc19c-f15f-4a62-8b9f-45d342d95bb6-isc-report.pdf>; Digital Divide Data: <http://www.digitaldividedata.org/services/>*



*“Workers at the BOP are also often self-employed, and ICTs support them in getting real-time information on the availability of work, and enabling better access to financial services, information, and markets.”*





And oftentimes, they continue to face a digital divide when ICT services might not be accessible as well. For example, websites designed poorly to include many images without text descriptions will be difficult to navigate for a person with visual impairments. The U.N. Convention on the Rights of Persons with Disabilities explicitly includes the elimination of “obstacles and barriers” to accessible ICT,<sup>104</sup> yet more needs to be done to ensure accessibility to information, services, and to employment opportunities.

#### **4.3.3 Increasing access for workers at the BOP**

This section looks in more detail at the relationship between ICT and livelihoods at the so-called “base of the pyramid (BOP),” among individuals living on less than US\$2.50 per day. With access to ICT increasing, even among people at the BOP, the various Internet and especially mobile telephone-based job searching and employment services hold significant potential to connect more people even of meager ICT means to work.

Given that it could be performed by low-skilled workers, microwork is often seen as a way to help provide income generation opportunities across urban and rural markets and to people who might not be considered for knowledge economy jobs. In some cases, microwork outfits even focus

on communities at the BOP. Somali refugees in Kenya, for example, were able to do microwork after Samasource provided them with the sufficient training and access to facilities, even though these refugees had barely used computers before.<sup>105</sup>

Workers at the BOP are also often self-employed, and ICTs support them in getting real-time information on the availability of work, and enabling better access to financial services, information, and markets. Surveys of mobile use at the base of the pyramid from Kenya lead to some interesting findings about the use of mobile phones for work at the BOP.<sup>106</sup> A quarter of survey respondents stated that they had earned money using their mobile phone. Of those who had earned money through their mobile phone, the majority did so directly, by getting more work because they were more “reachable.” The most commonly reported moneymaking activities were casual job offers (such as tilling a field or washing a car), reported by 35 percent of respondents, or opportunities to sell products or services (48 percent). Mobile money services are common, even among BOP users, and some 6 percent of respondents reported using M-Pesa, the most popular mobile money service, for work. Almost half of the respondents who reported using their mobile phones for employment earned less than KES 500 (US\$6) from the transaction.

## 5. Challenges and risks

As described earlier, ICT's increasing role in employment is not without challenges and risks. The most widely discussed challenge arising from the increasing use of ICT relates to the potential job losses due to the productivity gains in businesses. But there are many other challenges that arise from the increasing role of ICT in employment, including the separation of work from social safety nets, the dislocation of work, concerns about the balance between the quantity and quality of work, divergences in experience and skills, and the risk of older divides continuing. Initial analysis has exposed these challenges; others may emerge as transformations continue and deepen.

These are all complex challenges, and it is out of the scope of this policy note to address each in detail. Rather, their mention here is meant to spur a debate and discussion about how best these challenges and risks might be addressed in the future, especially given that the transformation of the nature of work and of the job is bound to change due to technological advances, apart from other factors. In this, due consideration must be given to those who are at risk of losing out due to these changes, as much as those who might be able to adapt and exploit these opportunities.

### 5.1 Job losses and decoupling

As indicated above, one of the most debated effects of the increased role of ICT in the world of work is that some jobs are lost while others are created. Part of this is due to the higher labor productivity that ICTs might enable within firms,

leading them to produce more with fewer people.

These changes do not affect everyone equally, however. In the developed world, technology is leading mid-skill workers to lose their jobs due to increasing labor productivity or the dislocation of work to where wages are lower.<sup>107</sup> On the other hand, research has found that the number of lower-skill service jobs in the U.S., for example, have grown even as other lower- or middle-skill jobs that could be automated or transferred to lower-cost locations, in manufacturing or office services for example, have disappeared.<sup>108</sup> And high-skilled jobs or those needing interaction and complex problem-solving may continue to grow.<sup>109</sup>

Another concern, potentially more disruptive to countries' political economies is the decoupling in time or space that occurs between job creation and job losses in the short-term. Decoupling in time refers to how the introduction of ICT might lead to job losses in the short term, and that the creation of new jobs due to the economic expansion effects may happen much later. A second decoupling effect is in space. Simply put, jobs lost in one location may be created elsewhere. One could easily compare the losses in manufacturing jobs in the U.S., with those losses concentrated in the Midwestern states, with ICT-related jobs created in the Bay Area, where the technology industry is concentrated.\* Indeed, such outsourcing could help address the geographic mismatches between

\* For an animation showing the shifting nature of job losses and gains, see Geography of Jobs. Tip Strategies, Inc. <http://tipstrategies.com/geography-of-jobs/> (June 10, 2013).

jobs and workers. Put another way, “workers with desired skills may be in short supply where companies are hiring, while places with the highest unemployment may have little job creation. This geographic imbalance is occurring both across national borders and within them.”<sup>†</sup>

However, policy-makers are often worried, especially about the displacement of jobs across borders, made especially possible with the increasing use of ICTs that allow real time interactions across continents. Such displacement could pose significant challenges to policymakers even if the long-term net effect of the introduction of ICT on employment is positive.

A third concern is that job gains and losses might correlate with demographic factors such as age and education, often putting pressure on the socially vulnerable. The inclusion of ICT in the workplace and as a medium to find and do work also poses challenges to older workers or those who are not “digitally literate” apart from the risk of job losses due to productivity improvements.<sup>110</sup> This implies that job losses might befall those who are most reliant on their employment.

At the same time, some companies also offer virtual work options to people of retirement age who have valuable skills that they wish to retain, or to retirees looking to supplement their incomes with flexible work. One large financial services firm hires retirees from all sorts of professions to answer customer service calls from their homes for several hours a day. The results have been good enough that the company intends to expand the program.<sup>‡</sup>

These job losses typically occur because of productivity improvements due to automation, or process improvements, for example, that ICT

might enable. There is a vigorous debate about the short-term versus long-term employment impact of ICT, among other technologies.<sup>111</sup>

The relationship between ICT and job creation and losses is complex and is subject to much debate.<sup>112</sup> For example, a recent example provided in the U.S. was the apparent reduction in the number of bank tellers as ATMs have become more popular. However, data suggest that both the number of bank tellers and ATMs in the U.S. have increased.<sup>113</sup> Yet, the politics of job losses at a time of economic crisis, especially in the developed world, poses a challenge to policymakers looking to expand the role of ICT in their economies. Given that technological change is difficult to prevent or delay, policymakers will thus need to consider how best they might respond to these challenges by preparing a future-ready workforce and ensure growth through these upheavals.

## 5.2 Separation of work from social safety nets

Even as new forms of work may expand labor markets and make them more inclusive, they may not embed in them the social safety nets traditionally associated with good jobs. For example, online contractors may not have access to health insurance or pension schemes offered to full-time employees in traditional jobs. They might also not have the opportunity to organize for their rights or to negotiate for pay.

This is a concern that focuses on developed countries, where social safety nets have been in place for many years. Arguably, working online may allow the unemployed—in developing or developed countries—to gain an income that could permit them access to such social services. Indeed, for developing countries such as India,

<sup>†</sup> Inputs provided by McKinsey Global Institute.

<sup>‡</sup> Input provided by McKinsey Global Institute.

*Some employment platforms are considering safeguards such as fair wage guidance, or are setting up health insurance schemes.*

where formal employment accounts only for about 10 percent of the total, or in El Salvador, where it is 69 percent, few social safety nets may hold workers back from exploiting new income opportunities.<sup>114</sup>

However, online workers should be aware of the rights they might miss, and have access to at least some social services even if they are not employed in traditional jobs. To address this concern, some employment platforms are considering safeguards such as fair wage guidance,<sup>115</sup> or are setting up health insurance schemes.<sup>116</sup> While not directly related to social safety, some of the online employment platforms also include information for workers on strategies to maximize their work and earnings.\*

Governments will need to consider how social safety nets might extend to include online workers, balancing the flexibility that underpins much of online work with the need to provide some basic protections for these workers.

\* For example, Elance provides weekly free webinars and an online resource center that offers content on how to be successful on that platform. The courses include “howhowHow to succeedsucceedSucceed on Elance,” an hour-long free course, jobs skills training, 45-90 minutes per class which costs \$25 per month for unlimited courses, and job skills testing for 10-20 minutes for free. Elance also publishes data on jobs available and rates that can be achieved to help workers earn more money. Elance partners with online training organization to conduct such skills training.

### 5.3 Quantity versus quality of jobs

One concern with ICT work is that these jobs might in some cases put quantity over quality. In some cases, the career growth path is unclear. In other cases, the nature of the work is unskilled, or may be deskilling. For some, virtual work due to its odd hours and repetitive nature lends to the description of “virtual sweat shops.”<sup>117</sup> This could exacerbate the problem seen in many young people, who are “trapped in low-productivity, temporary or other types of work that fall short of their aspirations and that often do not open opportunities to move to more permanent, higher-productivity, and better-paid positions.”<sup>118</sup>

Some crowd-sourcing and microwork firms have faced this criticism in the past, and have been criticized for involving their workers in small scale and repetitive work that have few long-term benefits and are typically linked to low wages.<sup>119</sup> Certainly, adding to the numbers of workers is less meaningful if viewed in this context.<sup>120</sup>

A parallel issue is that workers might also view these jobs poorly, as low quality or low value outsourcing. In some cases, cultural norms may regard a temporary or online job poorly compared with a traditional full-time job. This might put

off workers from seeking to participate in these opportunities.

The temporary nature of much of online work may also be a concern given that the ultimate goal is to support full time employment. Concerns are that online work might institutionalize the temporary nature of contract work, expose workers to volatility in earnings, and serve as a workaround to labor regulations, for example. Indeed, part-time and temporary employment has increased across developed countries, and is set to increase as firms seek to manage labor costs.<sup>†</sup>

While these concerns are valid, an alternative viewpoint is that oftentimes, the workers have few alternative sources of income and hence could benefit from such employment even if it is in the short term. In some cases, especially for highly skilled workers or “hyperspecialists,” this flexibility might increase their ability to diversify sources of income.

There is no universal solution to these problems. The formal rights and responsibilities of workers and employers vary significantly across jurisdictions. Informal assignment of values for different types of jobs or work varies for each culture and social system. However, it is essential for any consideration of ICT-enabled work to balance the quantity of jobs created with the quality of those jobs, and to avoid a focus only on the number of workers or jobs at the expense of creating the systems and opportunities for workers to find and do good jobs.

## 5.4 The dislocation of work

ICTs allow workers to be located anywhere, at least theoretically. While this allows firms to access a global talent pool, it also means that the increase in the number of firms or in economic activity in one location does not translate to the increase in employment in that location. For example, the growth of the IT industry in the U.S. might not anymore lead to an increase in labor demanded within the U.S., but to a growing demand for programmers who could work remotely from other countries.

And workers do not need to be part of the firm itself. An increasing amount of work might be achieved through networks of temporary online workers that in some cases have become long-term yet contingent workers for companies. This could affect the number of staff needed to start up SMEs. And indeed, a report by the Kauffman Foundation finds that the size of startup SMEs has been reducing, partly due to the greater use of temporary or outsourced employees,<sup>121</sup> both trends that ICT-enabled employment could enable or even accelerate.

Yet, alongside the concerns with online contracting, as with outsourcing, some evidence is appearing to show that firms that would otherwise not hire and hence grow are doing so because of their access to global talent pools. In one survey oDesk found that “three-quarters of businesses say it would have been difficult to hire a local, on-premise worker to fill the need for which they hired their online worker.” Moreover, “83 percent of businesses indicated that they would not have hired locally if online workers were unavailable.”<sup>122</sup>

<sup>†</sup> Inputs from McKinsey Global Institute.







## 5.5 The risks of exclusion due to access divides

Even as ICT jobs could help employ more people and create new income generating opportunities in the developing world, there are risks that older divides might hold countries or regions back from connecting to work.

Three such divides that could create entry barriers for workers are the digital divide, the language divide, and an “access” divide, referring to the ability of individuals to find and do work with the least regulatory burdens.

The digital divide arises from the variations in access to ICT across geographies. For example, while 27 percent of the population in middle-income countries use the Internet, in low-income countries, the use drops to 6 percent (in 2011).<sup>123</sup> This is not only due to variations in infrastructure deployment, but also to price.

A language divide might also hamper workers’ online efforts. While skills in computer programming or graphic design might be global, the languages in use on the Internet, and in

correspondence with employers is predominantly English, Chinese, and Spanish, which together account for almost 60 percent of the Internet in terms of users.<sup>124</sup> For workers who might not be familiar with these languages, the pool of employers to work with reduces significantly. This is also relevant for ICT sector jobs, where ICT specialists are often found to be lacking in communication skills, and where ITES/BPO jobs often demand a high level of language skill.

Finally, the access divide might also prevent labor mobility, restrict workers from working for foreign-based employers, or place higher tax burdens on foreign-earned incomes. Some countries have very strict travel-exit procedures in place, limiting the global work that otherwise qualified individuals could do.

These divides, which come into focus due to the globalized, technology-dependent nature of ICT jobs, are thus important for stakeholders in the public and private sectors (as well as in academic or training programs) to consider to ensure that their presence does not perpetuate inequalities of the past.

## 6. Enablers for impact

What could governments do to create more employment opportunities and enable people to find ICT industry jobs and ICT-enabled work? This section focuses on this question, proposing an initial framework to consider various policies and programs to prepare governments for these changes and maximize employment opportunities.

Our initial research and consultation suggests that the following five enabling systems would support an increase in the number of jobs, would prepare workers to access ICT industry jobs and ICT-enabled work, and would help mitigate some of the risks and challenges discussed in this note:

- **Human capital systems:** Ensuring that the labor pool has appropriate ICT skills, and has the awareness and the soft skills required to participate in the labor market;
- **Infrastructure systems:** Ubiquitous connectivity to ICT, access to reliable and affordable electricity and to safe transportation systems, infrastructure to support innovation, and SMEs' adoption of technology;
- **Social systems:** Networks of trust and recognition for workers and employers to evaluate and reward each other's competencies and performance; social safety nets and a focus on quality to minimize the negative outcomes of ICT-enabled employment;
- **Financial systems:** Efficient and accountable systems to ensure timely payments; and access to finance to support innovation and entrepreneurship; and
- **Regulatory systems:** An enabling environment

that creates employment opportunities and increases labor market flexibility while balancing with the rights of workers.

The following discusses each of these enabling systems and emerging best practices to help activate each of these systems. In closing, we discuss the possibility of mapping these enabling systems to the specific ICT-enabled employment opportunities available in different economies. However, given the limitations of scope at this stage of analysis, this policy note only provides a summary and overview of these systems. Subsequent analytical efforts will expand on the material included here.

### 6.1 Human capital systems

Human capital systems ensure a supply of appropriately skilled workers, innovators, and entrepreneurs. The ICT skills imparted to students and to workers need to address the constantly evolving needs of industry. They also need to cover the range of employment opportunities—from basic ICT skills (digital literacy) for most people to advanced high technology skills for ICT job seekers—and create the cadre of individuals who have skills to be innovative, creative, and entrepreneurial.

Human capital systems are important because many countries simultaneously have the problems of high unemployment and a lack of skilled workers. The challenge or even crisis in creating good jobs gets compounded by significant skills

gaps that often leave many positions unfilled. A survey by the McKinsey Global Institute found that in 2011, a quarter of surveyed employers in Europe had reported difficulty “filling jobs for lack of qualified talent, particularly technicians and engineers.”<sup>125</sup> And IT consultancy Gartner estimates that by 2015, big data could create three million more jobs than there will be skilled professionals.<sup>126</sup> These concerns extend to developing countries as well. India’s NASSCOM projected that the country will face a shortfall of half a million skilled workers in 2010.<sup>127</sup> In the absence of appropriate skills, alongside unemployment, one might find unfilled jobs.

Moreover, education and training programs need to evolve and adapt to prepare young people with employable skills, and prepare older workers to embrace technological change. Children who start school in 2013 will graduate from college in about 2030 and will be seeking work in a future that we can barely predict (consider that the first iPhone was sold only in 2007). Similarly, older workers, and especially those who are at risk of losing their jobs due to technological changes, would need the training and support to learn new skills.<sup>128</sup>

Countries will thus need human capital systems that address these challenges. This would call for adaptable ICT skills development programs that connect education to employment, raising awareness about new job searching tools and ICT-enabled employment opportunities, and using ICT to support training and education. These systems will also need to impart the skills to help make students and workers more creative and entrepreneurial.

**Skills development.** Perhaps the most important set of interventions relate to skills development. There are many programs worldwide focusing on bridging the gaps between formal

education and employable skills and competencies.\* Such bridging programs typically include the technical skills that employers seek, and the “soft” skills that help workers become more creative and better communicators, managers, and team-members.

There is no one reason why formal education systems do not succeed in developing the needed ICT skills. Depending on the country, reasons include delays in updating curricula, lack of teachers who have the needed qualifications, and limited infrastructure to support excellence in education. Some countries’ education systems might also not put in place the incentives or training for educators to use IT resources that may be available, limiting efforts to develop digital literacy, for example.

The most effective programs to bridge education to employment focus on developing ICT skills aligned with industry requirements. They often use innovative models connecting the public sector, private sector, and academia to identify skills demanded locally and globally, the gaps based on that demand, and interventions to boost university curricula or train existing workers. Those skills include technology- or industry-specific skills, but could also include broader skills, e.g. management, communication, language, critical thinking, and creative skills.

One notable program is EDUEgypt, being implemented by the ministries for higher education and for ICT, in close partnership with leading IT-ITES companies, to enhance the employability of Egyptian graduates and prepare them for the local and global market. Since its start in 2008,

\* For a detailed examination of some programs that bridge the gap between education and employment, see McKinsey Center for Government. Education to Employment: Designing a System that Works. (New York: McKinsey & Company, Inc., January 2013):

## connectingtowork/enablers\_for\_impact

EDUEgypt has been expanded to 10 universities and has served over 10,000 students.<sup>129</sup>

Even in countries with dynamic ICT sectors, skills development remains a priority. In the Philippines, for example, the Government is planning to set up a virtual university for business process outsourcing to train an additional 10,000 students and support the growth of the ITES sector.<sup>130</sup> India, another leading ITES destination, is also embarking on a national program that aims to improve the skills of 500 million people by 2022. The National Skill Development Corporation of India aims to do so in partnership with the private sector. Set up in 2009, the program covers 21 sectors, including IT, software, ITES-BPO, and electronics hardware. It seeks to define and apply global standards for skills development in partnership with industry, developing frameworks for curriculum and quality assurance, and funding skills training programs.<sup>131</sup>

The World Bank has also been supporting countries in Sub-Saharan Africa since 2008 in building skills for the knowledge economy among their citizens. The focus has been to promote “globally benchmarked, employable skills for the Information Technology (IT) and IT Enabled Services (ITES) industry.” As a part of the program, ACCESS Nigeria is being implemented to build globally-benchmarked skills for IT-BPO, and links certified candidates to jobs through an industry-endorsed program. The first phase, completed in 2011, successfully assessed 3,400 students and trained over 1,500 students. In Kenya, a Software Developer’s Certification (SDC) Program, branded “Chipuka,” is being implemented by the Kenya ICT Board in partnership with Carnegie Mellon University, with the aim to train and certify software developers and boost practical skills for employment.<sup>132</sup>

A large-scale approach to align skills with industry requirements is also being implemented in Mexico. MexicoFirst was established as part of a World Bank funded project aimed at the development of the IT industry in Mexico. MexicoFirst designs training programs for the IT industry and also negotiates with leading industry certifications in order to provide these at more affordable rates. As of today, MexicoFirst has helped Mexico issue more than 30,000 high level certifications.<sup>133</sup>

In some cases, specific companies have been investing in skills development programs aiming to build both broader competencies and specific skills in the systems they have developed. Cisco, a networking technology company, has a worldwide network of Cisco Networking Academies. These academies have trained over four million students since 1997 to secure industry certifications and to improve technology and business skills.<sup>134</sup> In 2013, SAP, a major enterprise software provider, set up a “Skills for Africa” program to impart global IT and business skills that would also support their ecosystem of products and services.<sup>135</sup>

Recognizing the global nature of ICT-enabled employment, an important part of some programs is language training. In Bogota, for example, a program called “Talk to the World” focuses on building the skills of poorer, working age people focusing on English training and certification. Since 2008, over 12,000 people have been certified as part of this program.<sup>136</sup>

Finally, in order to effectively train ICT skilled workers and match them with ICT-related jobs, a common definition of ICT skills competencies is required. The absence of such definitions limits the ability of jobs matching services to truly connect workers with employers where the skills match the needed profile of work.

The EU has developed an e-competence framework to address this challenge. The framework includes “36 ICT competences that can be used and understood by ICT user and supply companies, the public sector, educational and social partners across Europe.”<sup>137</sup> This enables better talent management and development, job description, and skills identification for employers, workers, and trainers.<sup>138</sup>

**Raising awareness.** Information about new avenues for employment often spreads by word-of-mouth. As governments and businesses seek to drive employment and attract qualified workers, coordinating efforts to raise awareness about new employment opportunities could have a positive effect. It will be critical, however, to communicate both the opportunities and risks inherent in new forms of ICT-enabled work, for example.

Awareness building can have significant positive impacts. The World Bank has been working with the Government of Nigeria to take advantage of virtualized job opportunities by leveraging various microwork and online contracting platforms. The government launched an awareness building campaign about these opportunities that led to increased registrations (up by 40 percentage points) and hiring (up 26 percentage points), and then leading to increased earnings (up 13 percentage points).

**Using ICT for education.** Even as ICT poses a challenge to workers to maintain their skills, ICTs could also support skills development, training, and education. Growing from efforts to enable distance learning, recent developments that have spurred much interest are online learning platforms and massive online open courses (MOOCs). MOOCs are now part of a pilot in Tanzania, sponsored by the World Bank, where course curricula are aligned with the needs of the

local private sector, and focus on IT and business skills that are in demand in that economy.\* For example, companies such as Coursera make free coursework from over 60 universities available online. Over one million students sign up on that platform every month.<sup>139</sup> Some programs teach specific skills, such as programming, online—sometimes free and sometimes for a fee.<sup>140</sup>

For now, many of these resources depend on broadband Internet connectivity, which is limited in some cases. Workarounds are possible; SAP’s Skills for Africa program recognizes the limits to Internet availability and gives students their courseware on a USB “dongle.” But the idea that ICT could support the education and training agenda is key, and one that could enable rapid, large scale delivery of employment-relevant education and training.<sup>141</sup>

## 6.2 Infrastructure systems

Whether one is working in the ICT sector or using ICT to connect to work, both the worker and employer need to have access to affordable, quality infrastructure systems. With ICT as a focus, either as a job function or a tool for workers, access to high-speed telecommunications connectivity—broadband networks—is essential. These networks go beyond connecting people to work; they are the foundation for the knowledge economy, connecting workers to global knowledge and commercial networks.

Yet access to broadband is not enough. Costs of doing business escalate if workers, businesses,

\* A MOOC is an online course, usually at the university level, offered for free over the Internet, which aims for large-scale (some courses have enrolled over 100,000 students at a time “open” (anyone can join) participation over the Internet. Michael Trucano, “Moocs in Africa.” EduTech, April 12, 2013: <http://blogs.worldbank.org/edutech/moocs-in-africa> (June 10, 2013).

## connectingtowork/enablers\_for\_impact

and even Internet service providers do not have access to affordable and reliable electricity supplies. And although ICT work might be virtual it nevertheless relies on the movement of people and goods. Hence, access to transportation also supports this agenda.

This brings up an interesting and under-studied aspect of ICT based work: that there are very real implications of the virtual world. Concerns are mounting in some quarters about the increasing consumption of electricity by the ICT sector, for example.

Other enabling infrastructures support innovation, for example, programs to fund research & development in the ICT sector, or creation of IT parks, both in their traditional physical form and in newer virtual forms. And SMEs will need support to exploit improving infrastructure access and adopt ICTs as they grow to increase productivity and access global markets.

We investigate these aspects here, identifying some opportunities for stakeholders to consider when developing these enabling infrastructure systems in the context of ICT and employment.

**Ubiquitous connectivity.** Fundamentally, ICT-enabled employment is driven by connectivity. Broadband networks, especially, have been identified by many stakeholders as critical enablers of online employment.

Governments will need to consider a range of programs and policies to ensure that broadband networks—wireless and wired—will be ubiquitous, of high quality, and affordable. The reader is directed to a range of resources on that topic.\* To summarize, improving access to broadband will

need attention to at least three aspects:

- **Availability:** This will need countries to ensure that they have sufficient international connectivity and widespread local networks so that businesses and individuals can connect to global information resources and markets. Even as mobile Internet services will help extend coverage, countries will need to support the expansion of fixed broadband networks that truly allow reliable, high quality connectivity for IT businesses.
- **Affordability:** Broadband services will also need to become more affordable so that more people can connect and access the global employment opportunities, and so that more businesses are able to participate in global economic processes.
- **Attractiveness:** In many cases, broadband services are undersubscribed because potential users do not see specific benefits in connecting.<sup>142</sup> Awareness about income earning possibilities online could help spur broadband adoption.

Broadband networks also support innovations that influence employment. Cloud computing, collaborative design platforms, or 3D printing, for example, need broadband networks to function. And access to the Internet will help more businesses startup; one estimate suggests that improving Internet access in the developing world could support over 143,000 startups annually.<sup>143</sup>

Countries will derive varying benefits from ICT work because they have varying levels of broadband market development. For countries that are looking for ways to expand employment opportunities, placing an emphasis on the expansion of broadband networks will be a necessary step.

**Reliable and affordable electricity.** An often

\* The reader may refer to the following resources: *ICT Regulation Toolkit* (<http://www.ictregulationtoolkit.org/en/home>), *Broadband Strategies Toolkit* (<http://broadbandtoolkit.org/en/home>), and the *World Bank's Information & Communications for Development series* (<http://go.worldbank.org/0J2CTQTYPO>).



overlooked but essential infrastructure for the functioning of the knowledge economy is electricity. Widespread access to reliable, safe, and affordable electricity supply is a key enabler for online employment, supporting the knowledge economy.

As battery technology has improved, it may be possible for some workers to operate “off-grid” and with increased mobility for extended durations. However, long-term and sustainable activities in the knowledge economy would require access to high quality electricity services. In cases where electricity is not guaranteed, the impact on ICT workers can be significant. For example, India suffered its worst blackout in July 2012, leaving over 600 million people without electricity.<sup>144</sup> This had a negative impact on perceptions of business climate and had immediate impact on the operation of many ICT workers.<sup>†</sup>

There is another important aspect of how electricity intersects with online work. Much of the online work today is done over networks and cloud computing platforms. These networks and clouds consume significant amounts of electricity. Estimates suggest that data centers already consume about 2 percent of the electricity produced in the U.S., for example,<sup>145</sup> and additional energy consumption is due to the telecommunications access technologies that connect workers to the cloud.<sup>146</sup> Certainly, as IT becomes more energy efficient, this impact may reduce. But it will remain important to ensure that the growing virtualization of work does not have negative unaccounted consequences for the environment.

#### Safe and efficient transportation services.

<sup>†</sup> For example, oDesk workers in India logged in less time during this blackout, most likely due to their inability to use their computers or Internet connections. See Odesk. The Blackouts in India, Seen in Odesk Data. by John Horton. (August 6, 2012): <https://www.odesk.com/blog/2012/08/the-blackouts-in-india-and-odesk-impact/> (June 10, 2013).

Transportation services are also often overlooked, given the presumed virtual nature of ICT-enabled employment. However, many workers whether in the ICT sector, or in the informal sectors but using services such as babajob, rely on safe and efficient transportation services to ferry them from their homes to workplaces. Indeed, worker safety during travel has been a long-standing concern for many call centers in India, which often organize their own bus services to carry workers (especially women) from their homes to the workplace and back.<sup>‡</sup>

Transportation systems are also essential for the movement of goods, including ICT hardware and devices, and products of ICT-enabled workers, SMEs, or companies that are engaged in non-digital production, e.g., agriculture and manufacturing.

**Innovation infrastructure.** Innovation drives economic growth. There are significant opportunities in store for countries that have innovative workers. Innovations in the ICT sector drive employment both directly—as new firms are created to exploit and commercialize those innovations—and indirectly, through the benefits of ICT innovations to other sectors (e.g., cloud computing, mobile applications).

Countries looking to support the development of their innovation ecosystems will need a combination of factors to be in place. For one, there needs to be coordination across the public and private sectors and with academia, creating an ecosystem to incubate innovation.<sup>147</sup> Funding for research & development activities that promotes

<sup>‡</sup> Although there have been cases of such services failing to provide the needed level of safety. See, for example, Reena Patel, Working the Night Shift: Women’s Employment in the Transnational Call Center Industry. (Austin, Tx: The University of Texas at Austin, May 2008): <http://repositories.lib.utexas.edu/bitstream/handle/2152/3941/pateld76136.pdf?sequence=2> (June 10, 2013).

## connectingtowork/enablers\_for\_impact

such coordination is often lacking, but can have great impact when managed transparently and efficiently. The policy environment to enable innovation will also need attention, ensuring that they empower innovators, create a favorable business climate, foster partnerships, enable knowledge creation and flows, and have robust institutional support.<sup>148</sup>

Infrastructures that support innovation also play an important role. Most common are IT parks, which host ICT companies and link them with other tenants and intellectual and financial resources. Earlier models for such parks were physical (with buildings), and their success was determined by a range of factors of which critical ones were: the ability to manage their operations effectively, which is typically achieved through private sector leadership (often supported by PPPs); creation of links with partners including academic institutions, R&D centers, and financiers; provision of world-class infrastructure; and availability of qualified talent.<sup>149</sup> Newer arrangements have appeared that leverage ICT access to create virtual IT parks and enable lightweight models that plug local innovation ecosystems into global networks.<sup>150</sup>

**SME adoption of technology.** As infrastructure access grows, it could enable more SMEs to use technology in strategic ways that enhance productivity and earnings and thus assist in job creation. However, SMEs, particularly in developing countries, have been slow to adopt ICT due to various supply side constraints (e.g., lack of ICT infrastructure, ICT products not tailored for SMEs) and demand side constraints (e.g., lack of skills, awareness, and finances).

To mitigate these challenges, many countries have developed schemes to help ICT adoption by SMEs.<sup>151</sup> For instance, the Infocomm Resource

Centres (SIRCs) in Singapore provide advisory and pre-project consultancy services, as well as IT clinics and workshops for SMEs. Another example includes a program launched in 2012 by the ASEAN Foundation in partnership with Microsoft that provides ICT training programs for young entrepreneurs and SMEs, with focus on the latest ICT applications. The project is expected to reach close to 1,000 SMEs from Indonesia, Thailand, the Philippines, and Vietnam.

There is a risk that some SMEs might outsource work online to an extent that net job creation in a local economy might be limited. However, the likelihood of this being a dominating effect seems small for now, especially given that SMEs will continue to participate in sectors such as agriculture and manufacturing where online outsourcing is less likely than in the service sector. Moreover, SMEs could grow faster due to the increased connectivity and competitiveness from ICT use, and hence hire more workers.

### 6.3 Social systems

Working in the ICT space, even though digital and virtual, often intersects with very real social concerns. We segment these concerns into two groups. The first relate to implications for workers, in terms of their potential for job losses (at least for some groups of workers/job categories), and to be of poorer quality compared with some traditional forms of work. Stakeholders will need to consider these social implications and how they might address them through social safety nets and protections.

The second set of concerns has to do with trust and recognition. Employers are keen to validate their employees' antecedents or verify skills and maximize reliability. At the same time, workers

seek recognition, and want to benefit from that recognition in terms of improving work opportunities, higher incomes, and social status. Hence, ICT-enabled employment needs systems of trust and recognition to succeed.

**Social safety nets.** It is inevitable that some workers will lose their jobs as ICT plays a greater role in work. Some of these workers will be able to find new jobs if they are provided with training and support to make the transition. However, not all workers will make the transition successfully, and there is a likelihood that workers who are socially vulnerable (older workers, people with disabilities, lower skilled workers) might be disproportionately affected.

Hence, social safety nets will play a role in supporting and protecting these workers from negative outcomes. Throughout, however, the focus—as far as possible—must be on helping these workers make the transition from support to employment or even self-employment.

The design of these social safety nets will vary with local circumstances. For example, one perspective gathered from our consultations on this policy note was that social safety nets are more relevant in the developed world, and more for manufacturing workers, whose jobs might be displaced due to the introduction of technology in their workplaces.

However, there are concerns about rising or persistent unemployment in many countries and about the potential negative impact that the introduction or growing use of ICT could have on many workers in the developing or developed world. Therefore, it will be critical for public and private sector stakeholders to consider what social safety nets are most appropriate to minimize the negative implications of ICT-induced job losses or displacement.

And for workers in the ICT sector or who participate in ICT-enabled work, there is a need for stakeholders to ensure that the work is of good quality, providing adequate incomes, offering some basic social safety nets, ensuring positive work environments where applicable, and giving them a chance to develop skills and progress in their careers.

**Trust and recognition.** Among ICT employers, such as software firms, one of the key considerations is having access to reliable staffers with verified credentials. One of the most common ways to ensure this is via widely used certification programs. Major vendors such as Microsoft, Cisco, and Oracle, for example, have long-standing and widely trusted certification programs through which workers demonstrate their knowledge of software, hardware, and networking technologies and systems.

At the same time, some systems are emerging to create skills registries that include information on ICT professionals to allow employers to validate the educational and work backgrounds of their employees. For example, India's NASSCOM, an IT industry association, has created a National Skills Registry, a “national database of registered and verified knowledge workers in the industry.” The registry includes a permanent fact sheet on the professional along with photographs, background check information, and even biometrics to ensure unique identification.<sup>152</sup> Governments could also take a role, in partnership with private sector firms and academic and training institutions, to develop skills verification mechanisms and standardized certification programs to increase trust of employers in ICT-enabled workers' skill sets and competencies.

Online employment platforms have systems of feedback provision through which employers

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are able to offer their ratings on performance and quality of work done. These ratings, which are shared with other potential employers, often include specific feedback on the tasks completed. Workers can be sorted by average feedback ratings, allowing strong performers to benefit from positive reviews. These workers can also take tests to demonstrate their abilities in specific types of work or skills, for example, in languages or in using specific computer software, which is particularly relevant for first time workers who have not yet established themselves.

These mechanisms may not be regulated outside of the platforms themselves, but they could borrow frameworks from external sources (such as the e-competency frameworks) if those are available.

### 6.4 Financial systems

Financial systems are an integral part of the ICT for jobs agenda for two reasons: they enable payments to workers for work done, and because access to finance is critical for SMEs. The challenge is to have efficient payment systems in place that can ensure workers are paid quickly and with the least cost burden. At the same time, they need to adhere to complex global and country-level financial regulations.

Second, much of the job creation and innovation in ICT and using ICT is done by SMEs, many of whom face difficulties in accessing finance. This gap will need to be addressed, especially as it could help in increasing the adoption of ICTs by SMEs.

**Efficient payment systems.** Payment systems that are global, and allow low cost and secure transactions, while ensuring compliance with international standards, are critical to the functioning of the online employment ecosystem.

For example, oDesk finds that major geographic gaps in its contractor base occur where local online payment systems are unavailable or very cumbersome.\*

Micropayment transfer support is essential for microwork. These payment systems will need to transfer small amounts of money, sometimes in irregular patterns, to large numbers of workers. Governments may need to enable international and domestic micropayment services to give employers and workers access to efficient and cost-effective payment transfer mechanisms with low transaction costs.

Key concerns include money laundering, and local rules and practices will need to ensure that payment systems adhere to global rules. However, this also means that setting up payment systems is highly complicated, with every jurisdiction having different interpretations and implementations of global standards.

It might also be possible that payments for work could use non-currency means, for example, paying through an Amazon gift card in the case of AMT, and airtime rewards for respondents on Jana, a crowdsourcing survey platform.<sup>153</sup> The concern here is the cost and risk associated with the conversion of non-monetary in-kind payments to cash. Consequently, countries might be better off ensuring low cost and simplified payment systems.

**Access to finance.** Access to finance is one of the key constraints for SMEs and companies that are looking to launch or expand, and hence has an impact on job creation. According to the IFC, the likelihood of a small firm having access to a bank loan in low-income countries is about a third of what it is for a medium-sized firm, and less than half of what it is for a larger firm.<sup>154</sup>

\*Inputs from oDesk.





*Countries that are less developed in telecommunications connectivity but have well developed financial systems, human capital systems, and can put in place enabling and balanced regulatory frameworks can also benefit from these opportunities.*

## connectingtowork/enablers\_for\_impact

Evidence suggests that close to 45 to 55 percent of the formal SMEs (11–17 million) in emerging markets do not have access to formal institutional loans or overdrafts, despite a need for one.

The situation is more severe for ICT SMEs, as they rarely have tangible assets to use as collateral to secure loans, and because potential financiers often lack the skills to evaluate ICT projects. Many countries have begun to set up financing mechanisms to address these gaps and include measures such as to reduce interest burdens on SMEs or to share risks with financiers. For example, Brazil's Juro Zero program provides ICT firms interest-free loans, while also providing a 50% guarantee on loans extended to small operators within the framework.<sup>155</sup>

### 6.5 Regulatory systems

Countries looking to enable innovation and growth in the ICT sector, or who seek a greater role for innovative services to maximize ICT-enabled employment, will need to consider restructuring or rebalancing their regulatory systems to enable growth while providing workers and employers with necessary protections. The reader is directed to the various resources available online to identify opportunities to maximize growth in the ICT sector as noted earlier. Here, the focus is on those regulatory levers that could enable both employers and employees to maximize the benefits of ICT-enabled employment.

**An enabling business climate, especially for SMEs.** At the core, governments will need to ensure that employers have the opportunity to operate and grow their businesses without unnecessary impediments. To that end, countries' business climates will need to be positive and

supportive of new business creation, growth, and even closure.

Of special importance, given the growth and job creation potential of SMEs, there is a need for countries to ensure an enabling environment for SMEs to flourish. These conditions include adequate policy, legal, and regulatory frameworks; favorable investment climate; finance mechanisms for SMEs and early stage startups; and enabling infrastructure.

While it is difficult to make general statements, there are a few possible actions that governments could consider and evaluate. Policies and legal and regulatory frameworks play a critical role in improving the SME landscape. Policies that limit the flexibility of labor, finance, technology, or land markets can significantly hinder SME growth and impede the spread of new technology and innovations.

**Labor rules.** The development of balanced labor regulation is necessary to protect workers, attract foreign job providers, and ensure flexibility in the labor market. Online work must not exploit the worker, yet, flexibility in obligations for part-time and subcontracted work online will lead to more flexibility in business operations. Rules about when workers can access benefits need to be clear, but also need to respond to the changes in the nature of the employer-worker relationship. Extremely strict rules might limit the interest of some employers to enter certain markets, while at the same time, workers should know their rights and have access to benefits if they are eligible.

On the other side, policymakers will also need to remove impediments to workers participating in the global jobs market, and to people who seek self-employment via participation in online work.



For example, in Bangladesh, the government abolished the tax on income that was coming from work abroad done online. In other countries, people can only work for foreign parties if they secure case-by-case permissions from labor market regulators or foreign ministries, effectively converting the online contracting opportunity into a grey market activity. Self-employment should also not attract undue regulatory or tax burdens. The result may be the creation of a grey market for labor, as is seen anecdotally in many Eastern European countries; software programmers and designers often remain “under the radar” and informal, limiting the benefits that the creation of a vibrant community could bring to the development of the ICT ecosystem.

**Other rules.** Governments will also need rules that ease doing business. For example, cross-border taxation should be simplified. Tariffs on imports of hardware and software necessary to work in the virtual economy should be reasonable. The reduction of obstacles for visitors to obtain

visas for investors/foreign staff could facilitate market development as well. Finally, adequate intellectual property (IP) and data privacy protections need to be in place (and be enforced) to allow employers to engage workers who access confidential data and corporate IP, participate in business processes, and other protected data or information.

## 6.6 Enabling systems and ICT-enabled employment opportunities

We propose that the presence and status of these systems of enablers will determine which opportunities are available to and benefit which countries, regions, and communities. This has a basis in some widely used indices that have already ranked various countries’ readiness to attract ICT sector jobs, especially in IT services (Box E).

The scope of this policy note is limited and we

### Box E. Ranking a location’s ability to attract ICT jobs

A number of organizations have defined methodologies to rank the ability of economies to attract ICT jobs. For example, A.T. Kearney, a consultancy, has a Global Services Location Index, which “ranks the top 50 countries worldwide as the best destinations for providing outsourcing activities, including IT services and support, contact centers and back-office support.” This index includes three measures to determine the ranking: financial attractiveness, people skills and availability, and business environment.

IT consultancy Gartner has a 10-criteria evaluation scheme to evaluate leading locations for offshore services. The 10-criteria include “language, government support, labor pool, infrastructure, educational system, cost, political and economic environment, cultural compatibility, global and legal maturity, and data and

*continued*

## connectingtowork/enablers\_for\_impact

intellectual property security and privacy.” The World Bank also has developed a ”Location Readiness Index,” noting that these various indices broadly agree on key factors that determine competitiveness of locations to attract and support IT services. These are: “availability of employable skills, competitive costs, quality of public infrastructure relevant to the IT services and ITES industries, and an overall environment that is conducive to business.”

Some regional indices also exist. In 2010, for example, the Fraunhofer Institute for Systems and Innovation Research (FISI) developed an index to evaluate the European countries’ competitiveness for the software and IT services industry. In that index, the main factors include economic effects, innovation and R&D activities, level and quality of demand, framework conditions for the software industry, and general framework conditions.

The World Economic Forum’s 2013 Global Information Technology Report also proposes a Digitization Index, developed by consultancy Booz & Company. In an important finding, the Forum notes that the employment effects of increased digitization across countries and sectors are uneven. For example, advanced economies might create fewer jobs as their level of digitization increases, and that lower value added jobs may go overseas to less expensive labor markets, where digitization has a positive effect on employment. Some sectors such as financial services gain more in terms of productivity, while others such as retail gain more in terms of employment.

These rankings point to the complex relationships among various factors in determining an economy’s ability to attract and/or create ICT jobs. Moreover, they also suggest that more work needs to be done to expand such methodologies to include ICT-enabled work such as online contracting.

Sources: Ian Marriott, “Gartner’s 30 Leading Locations for Offshore Services, 2013.” Gartner, January 17, 2013: <http://www.gartner.com/id=2306315> (June 13, 2013); Sony Shetty, “Gartner says India Still No. 1 Destination for Offshore Services.” Gartner, December 21, 2010: <http://www.gartner.com/newsroom/id/1502714> (June 13, 2013); Booz & Company, *Maximizing the Impact of Digitalization*. (New York: Booz & Company, 2012): [http://www.booz.com/media/file/BoozCo\\_Maximizing-the-Impact-of-Digitalization.pdf](http://www.booz.com/media/file/BoozCo_Maximizing-the-Impact-of-Digitalization.pdf) (June 13, 2013); Fraunhofer, *Competitiveness Index for the Software and IT Services Industry in Europe*. (Karlsruhe: Software AG, May 30, 2010): [http://www.softwareag.com/us/images/Fraunhofer-ISI---Wettbewerbsindex-1.0-englisch\\_tcm89-76367.pdf](http://www.softwareag.com/us/images/Fraunhofer-ISI---Wettbewerbsindex-1.0-englisch_tcm89-76367.pdf) (June 13, 2013); A. T. Kearney, *Global Services Location Index*: <http://www.atkearney.com/gbpc/global-services-location-index>; The World Bank, *The Global Opportunity in IT-based Services: Assessing and Enhancing Country Competitiveness*, (Washington DC: The World Bank Group, 2010), 9: [http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/Global\\_Opportunity\\_IT\\_Based\\_Services.pdf](http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/Global_Opportunity_IT_Based_Services.pdf); AT Kearney, *Offshoring Opportunities Amid Economic Turbulence*. (Chicago, AT Kearney, 2011): 16 <https://www.atkearney.com/documents/10192/f062cf48-ee98-4312-ae4f-0439afc10880> (June 10, 2013).

do not propose a precise mapping of enabling systems to specific opportunities. However, it is possible to note that the countries where workers participate most in online work are also those that are ranked highly in these ICT industry indices (see Box E).

Yet, this should not exclude other countries from evaluating these new opportunities for ICT-enabled employment. Not every country may become a major ICT industry participant, but it is possible to see that many more countries have workers participating in online work, for example, than only these rankings would suggest. Efforts among online contracting or microwork organizations are to make more workers in more countries aware of the possibilities of engaging in online work.

Indeed, one of the most important findings of this analysis has been that while broadband connectivity is necessary, it is not sufficient to enable the global ICT-enabled work opportunity. Consequently, countries that are less developed in telecommunications connectivity but have well developed financial systems, human capital systems, and can put in place enabling and balanced regulatory frameworks can also benefit from these opportunities.

Hence, governments that are keen to realize the opportunity of ICT-enabled employment should at least consider which enabling systems need attention. Again, the ICT industry in a country or region might be relatively small, but other ICT-enabled employment opportunities might have potential to grow.

## 7. Conclusions and Policy Recommendations

This policy note opened with a question that faces governments around the world in an era where ICT is altering employment opportunities and is reshaping labor markets: *What could countries do to prepare for these changes and maximize employment opportunities?* This note is a first step in a planned longer-term effort by the World Bank's ICT Sector Unit to understand the implications of ICT for employment and how countries could respond given their specific circumstances.

The note considered two aspects of ICTs in employment. First, ICT has an impact on employment as an sector. Second, ICT has begun to play a role in empowering workers by making labor markets more inclusive, more transparent and innovative, and more efficient.

Countries at different stages of development have the opportunity to benefit from ICT-enabled employment, even if the extent of these opportunities available to each country might vary, given the differences in the status of the enabling systems that are discussed in Section 6. For example, some countries will be better placed in terms of connectivity infrastructure, others might have larger or more developed human capital systems, and as widely used indices referred to above suggest, these might open up more opportunities for people in those countries to benefit from ICT-enabled employment.

Each country will need to develop a mix of these enabling systems to exploit these opportunities. If countries are endowed with human

capital but not with the appropriate regulatory or financial systems, they will not be best positioned to foster entrepreneurship or a business environment that would create jobs. Subsequent research and analytical work will be needed to develop a model based on these ideas.

We recognize that each country will have varying combinations of enabling systems, and that countries should not follow a "cookie-cutter" approach. Yet some broad strategic considerations may be derived. We thus propose three possible strategic considerations for governments as they evaluate the opportunity and potential of supporting more of their citizens to connect to work.

First, *go beyond ICT jobs alone*. ICT jobs have significant positive spillover effects, but are only one part of the ICT-enabled employment opportunity. There is also an opportunity to use ICT to empower workers and to enlarge labor markets.

Second, *consider all enabling systems*. Job creation is a complex endeavor that will need attention to more than the growth of the ICT sector or connectivity. As this policy note discusses, policymakers will need to consider human capital development, enabling efficient financial and payment systems, and regulatory reforms, in addition to other actions to spur ICT-enabled employment.

And third, *consider country-specific circumstances to develop enabling systems*. Each country will need to prioritize its own set of actions to develop these enabling systems and unlock the

potential benefits of ICT-enabled work, even as they consider the risks and challenges arising from these new ways of organizing work. Governments could foster or enable “no-regret” actions, such as skills development or the creation of strategic connectivity infrastructure. Consequently, as described in Section 6, policy considerations for governments are as in the table below.

The changes that ICTs are causing to economies, to employment, and to workers’ lives are inevitable and they are global. The focus of governments should be to support and prepare their workers, businesses, and policy frameworks through and for these changes, mitigating the losses and maximizing the benefits.

Enabling systems	Summary of considerations
Human capital systems	<p>Bridge education to employment by developing skills for ICT jobs, and promoting digital literacy using innovative models to meet the demand for ICT skills.</p> <p>Raise awareness of ICT-enabled employment opportunities among workers</p> <p>Use ICT to support education and training for more people</p>
Infrastructure systems	<p>Create a broadband telecommunications connectivity infrastructure that connects more people to global employment opportunities, and acts as an enabling infrastructure for the ICT sector.</p> <p>Develop an innovation system that fosters partnerships among various stakeholders.</p> <p>Support SMEs in exploiting access to infrastructure and to adopt ICTs.</p> <p>Ensure access to reliable, clean, and affordable electricity to support sustainable expansion of the digital economy.</p> <p>Ensure safe and accessible transportation systems to ensure that employees (especially women and people with disabilities) can travel to and from their places of work.</p>
Social systems	<p>Create social safety nets to protect workers. Ensure quality of work, to maximize the number of good jobs.</p> <p>Ensure that workers in the ICT sector and ICT-enabled workers have validated credentials, that the quality of their work can be verified.</p>
Financial systems	<p>Expand access to finance for SMEs and entrepreneurs.</p> <p>Create efficient and reliable payment systems to ensure that workers are paid with few regulatory or financial overheads.</p>
Regulatory systems	<p>Balance rules to enable the growth of SMEs and attract employers, while protecting the interests of workers.</p>

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