
Innovation and Africa: an opportunity not to be missed

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Introduction

Africa faces a formidable unemployment challenge. Its demographic profile implies a major surge in the share of working-age population in the next two decades, while overall population will continue to grow rapidly. The issue on whether the continent's current economic growth trends will be sufficient to absorb at least a significant portion of the projected labor supply increase has been amply discussed, with an overwhelming negative answer¹. This paper claims that innovation could constitute the key to exploiting the continent's demographic profile as an opportunity for economic transformation. In particular, it aims at conveying two messages:

- The new wave of technological innovation, the so-called Fourth Industrial Revolution

(FIR), provides a major opportunity for transforming the continent and generating the needed jobs, without necessarily following the structural change pattern experienced in South East Asia and Europe.

- Africa would not succeed to absorb a significant portion of the projected increase in its labor supply, even if the employment in industry were to grow at an average rate twice as high as that experienced by the Asian Tigers during the last 25 years. Thus, Africa cannot afford missing the opportunities offered by the FIR, and should embrace, not resist, the ongoing wave of technological innovation. Relying on old-fashioned industrialization will not deliver the needed jobs, even under most optimistic assumptions on industrial growth.

Innovation and the new global economy

There has been much talk about the Fourth Industrial Revolution (FIR) and its impact on the global economy. The basic idea is that the new wave of technological innovation would not

¹ See for instance Louise Fox, Alun Thomas, and Clairy Haines "Structural Transformation in Employment and Productivity: What Can Africa Hope For?" IMF, Departmental Papers April 2017

only shift the production-possibility frontier through substantial gains in total factor productivity, but would also radically alter consumption, communication, and social organization patterns².

It is clear that the new wave of innovation has a huge potential for improving productivity and living conditions. However, these benefits are unlikely to materialize without causing major disruptions. Vast portions of the existing productive capacity will become obsolete and many assets will become stranded. For instance, driverless cars and their sharing are likely to make individual car ownership obsolete, the way in which typewriters disappeared quickly in the early 1980's, or the production of cameras and fax machines did in the last decade. Similar changes are likely to take place in other key sectors, such as energy with the demise of traditional grids in favor of mini generation-consumption grids, and the financial sector, with the demise of traditional banking as the result of the adoption of block-chain technologies that can eliminate information asymmetries.

The process is unlikely to be smooth because of its very nature and dimensions. It is difficult to imagine that the automotive industry will re-convert to the new consumption and production models in its totality. There will be winners and losers. There will be a major impact on employment levels and on the skills that will be required. Many workers will not be able to re-tool themselves toward the skills required by the new production model.

Clearly, the adoption of new technologies will face opposition. In fact, this has already been the case for driverless cars on security grounds, which is difficult to make sense of, if one thinks of how insecure traditional cars are. The diffusion of Uber or Uber-like services

has encountered major hurdles in France, Italy, and most recently, Egypt, because of pressures from taxi drivers, who have managed to influence regulations in their favor.

These oppositions have the potential to slow down the pace of innovation. Their strength and their likelihood to be effective in slowing down the innovation will crucially depend on:

How large the sector that comes under threat is relative to a country's economy.

How young is a country's workforce. The younger the easier to adapt to the new skill requirements. Old dogs do not learn new tricks!

Innovation and Africa

The notion that Africa is technological prone has been already discussed in the literature³.

The mobile-banking revolution, in particular the fact that Africa appears the most mobile-banked continent in the world, seems to be behind this idea. There are no doubts mobile banking is transforming the continent, by connecting previously excluded Africans to the formal financial sector and making a difference in providing opportunities for market participation even to people in most remote areas of the continent.

The continent is also seeing the onset and rapid expansion of, eHealth, edTech, agriTech, three solutions specifically adapted to the local needs related to some of the greatest challenges Africa faces: health, education and food security.

Drone technology already helps to deliver medical goods and constitutes a possible solution to the medical infrastructure deficiency, for in-

² See "The Fourth Industrial Revolution" by Klaus Schwab World Economic Forum 2015

³ See for instance the WEF report "The Future of Jobs and Skills in Africa: Preparing the Region for the Fourth Industrial Revolution" May 2017.

stance, in Rwanda. This technology already helps to maintain portions of the electric-power grid that come under threat from the tropical vegetation in Cote d'Ivoire.

Well-structured web-based classes make basic education now affordable not only in the urban slums but also in the remote areas of Kenya.

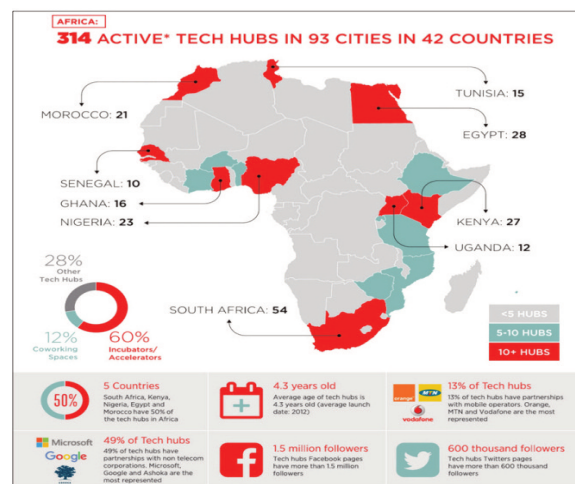
On-line platforms provide now customized advice on planting patterns and timing to many farmers in Nigeria. New technologies, such as block chain, in addition to limit information asymmetries in financial markets, can have a favorable impact on governance and corruption. Their use in managing public resources would greatly increase accountability by virtually making transparent and openly accessible all government transactions.

- Even plain-vanilla digitalization of payments businesses and people make to government has proved to have a favorable impact on reducing the scope for corruption. For instance in Tanzania it has already:
- Empowered its tourism sector by reducing economic leakage from cash payments, such as conservation-park entry fees, by over 40 percent, supporting investment and employment.
- Cut bureaucratic inefficiencies, including reducing import customs clearance times from nine days to less than one day.
- Increased transparency between citizens and governments in tax payments, by providing electronic proof of payments and protecting people against fraud.

The literature appears to explain the somewhat unexpected “blossoming” of creative applications of new-technologies in part of the continent with a more flexible regulatory environment than in industrial countries, where for instance the use of drones for delivering goods or gathering economic-relevant data is ham-

pered by strict security requirements. Quantitative evidence on this idea, together with an analytical framework, can be found on a recent paper by Fanizza and Boly⁴. Here, we use three graphs to illustrate the point.

First, the map below provide provide⁵ a sense of the extent to which innovation has spread around the continent.

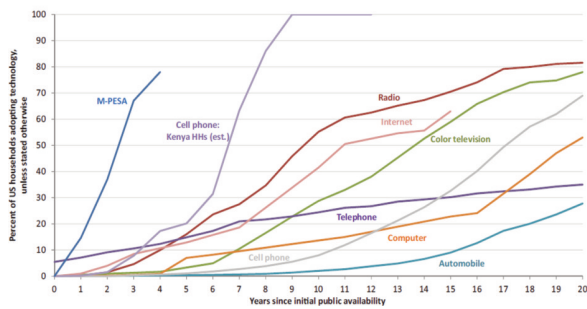


There are encouraging signs in several countries, which have seen a significant numbers of technological hubs to emerge. Of course, the picture for the continent is not uniform, and there are countries that have lagged behind and do not appear quite technology prone.

⁴ See “Innovation and Africa: Much to Gain, nothing to Lose!” by D. Fanizza and A. Boly, African Economic Consortium, June 2018.

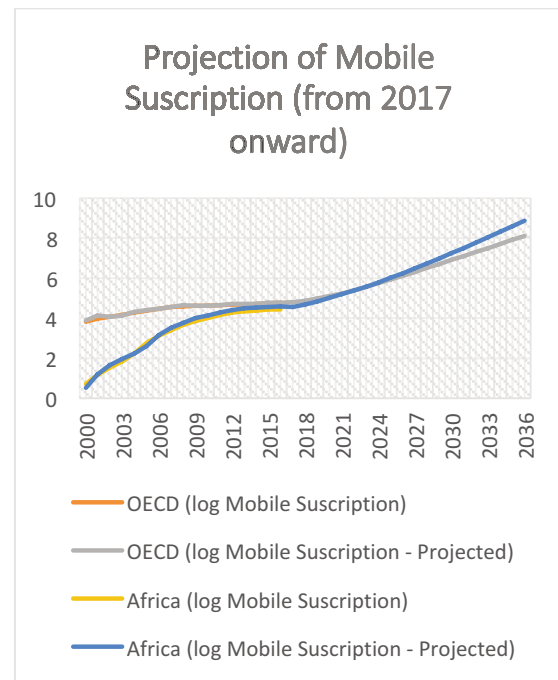
⁵ <http://www.visualcapitalist.com/africa-exploding-tech-startup-ecosystem>

Second, a comparison of the diffusion rates for Kenya's mobile-payments (M-Pesa) and mobile phones, and those of several historical innovations in the US. These two technologies have spread much faster than any other "transforming innovations" have in the US.

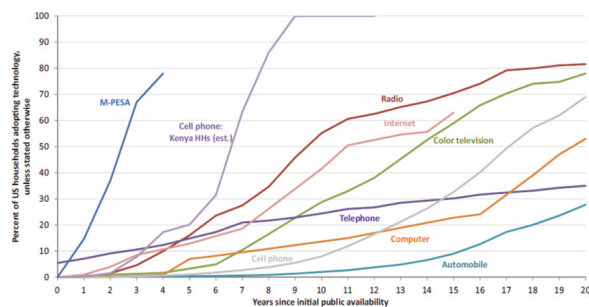


Third, the graph below compares the diffusion of mobile phones in Africa to those for the all OECD countries. If the experienced trend since 2000 continues, already in 2021 the number of mobile connections in Africa would equal those in OECD countries, and thereafter would it would become substantially higher. Of course, a caveat is needed, because there are no reasons why this trend should continue unabated over the years.

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Moreover, the fact that Africa has a relatively small "incumbent sector" (e.g. manufacturing), and a young population structure can make it a fertile ground for ongoing global wave of technological innovation. Based on estimated parameters from a cross-country panel data set for mobile- phone technology Fanizza and Boly (2018) have simulated the different impact that these two factors could have on the diffusion rates in Africa and in the OECD countries. The simulation shows that over time diffusion rates would increase substantially in Africa, whereas these would decline for the OECD countries, as shown by the graph below.

Can Africa rely on traditional industry?

To illustrate how the “traditional” pattern of structural change would not succeed to address Africa’s employment demand we use a simple simulation. We call “traditional” the pattern that sees economic development driven by productivity gains in industry. These gains attract labor supply from agriculture boosting industry employment, which in turn generates productivity improvements in agriculture, which then allow further shifts in the work force from agriculture to industry. The presence of, however, a productivity gap in favor of industry vis-a-vis agriculture (or services, for that matter) would allow sustaining a virtuous circle that provides labor supply to industry as needed, forcing productivity improvements in agriculture as a by-product. This mechanism would allow transforming developing economies along the lines experienced by Europe and South East Asia. This is the old basic Lewis model⁶, which has been proposed as a viable path for Africa by both J. Lin and D. Rodrick⁷.

We have built two scenarios based on the China’s experience. The first assumes a 6 percent annual growth in industrial employment, which is what China experienced during the last 15 years. The second assumes twice as much, 12 percent per year.

Under the first scenario, it is clear the gap between overall labor supply would actually broaden over time. However, even under the quite optimistic second scenario, growth in industrial employment would not keep the pace of labor supply, still raising the gap between 2040 from 2016. These dynamics would reflect

the base effect, because industrial employment levels in Africa are in fact quite low, whereas working-age population grows not only quickly, but also from a high initial level.

The message from this simulation is that the continent cannot make it if it follows the Lewis-type bluebook for industry-led development. Of course, productivity improvements in industry are to be more than welcome, but the point is that the continent cannot deal with its employment challenge without expanding employment in services and agriculture. Economy-wide productivity improvements are key! These need to happen in services, agriculture, and industry as well. Innovation provides an opportunity to achieve the needed economy-wide productivity improvements.

Conclusion

We have argued that Africa has virtually no alternative to embrace the new wave of technological innovations enthusiastically. Business as usual, even under the most optimistic assumptions, would not help to reduce the expected yawning gap between labor supply and demand in the continent. Our simulations suggest industry cannot create the necessary jobs by itself, agriculture and services need to play both major roles. This conclusion has implications for policy. First, governments should refrain from protecting economic activities that come under threat from innovation. Second, policies should aim at creating an enabling environment for technological innovation, and avoiding channeling resources toward the pursuit of industrial dreams. The fact that advanced countries have gone through years of heavy industrialization does not imply Africa should go through the same experience. There is no bluebook for economic development! In fact, the continent could use new technologies to avoid both the social and environmental costs industrial based growth.

⁶ Lewis, W. Arthur (1954). "Economic Development with Unlimited Supplies of Labor". The Manchester School.

⁷ See for instance J. Lin and A. Goldstein "Achieving an African Industrial Revolution" Project Syndicate February 2017; and D. Rodrick "Growth without Industrialization?" Project Syndicate October 2017.