BOOSTING TRANSFORMATIONAL TECHNOLOGY:

Creating supportive environments
for game-changing innovations

Chapter 3

Regulatory environment and technological innovation in Africa:

Any tension?

ISSUE BRIEF FROM THE AUTHOR

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Why is regulating technology important? Are regulations and the regulatory environment likely to stifle innovation in Africa? What regulations are appropriate and even helpful for innovation? How can governments balance out regulations and entrepreneurship? Is there tension between the regulators and innovators in Africa?

So far, nothing can elaborate on these questions better than the development, success, and spread of digital financial services (DFS) in Africa. In particular, Kenya's M-Pesa (as well as similar products in Kenya and Tanzania), a mobile phone-based banking product and later a technological platform, has pushed the frontier of innovation and financial inclusion without compromising financial stability. Kenya's combination of a supporting policy environment with a sound regulatory and supervisory framework allowed space for innovators and entrepreneurs to introduce financial innovations and a diversification of products into the market. Regulators agreed with the innovators on prudent risk management, and the policy environment ensured a stable macroeconomic environment. These combined factors ensured Kenya's success. These are major outcomes that form a strong base for lessons for 2017 in the African continent as well as for Kenya to sustain the frontier and move to the next level.

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to proactively shape market outcomes. This lesson has allowed innovators to successfully introduce new products into the market with new delivery channels and methods. Those countries have raised their financial inclusion profiles and created vibrancy in the financial market and the totality of their economies. Thus, different countries in Africa that have provided better regulatory environments even at extremes—such as the Kenyan case of "test-and-learn" approach—have found great success. The case is different for those countries that have not embraced the digital financial revolution; often their constraints can be traced to their prevailing regulatory environment, but not their prevailing legal frameworks.

The M-Pesa revolution and resulting technological platform developed in four innovative and virtuous stages, spurred by a conducive regulatory environment. First, the mobile phone platform was used for money transfer between users and later for payments and settlement—these uses were made easier and a rollout more possible in 2006 when the Kenyan government amended the communication law to recognize electronic units of money. The practicality of transforming cash into electronic units of cash, storing it on a SIM card, and simultaneously loading it into a bank account led to the development of a transactions platform in the absence of a national payments and settlement law. Second, encouraged by regulators, virtual savings accounts were developed using the same M-Pesa technological platform—impacting the banking intermediation process.

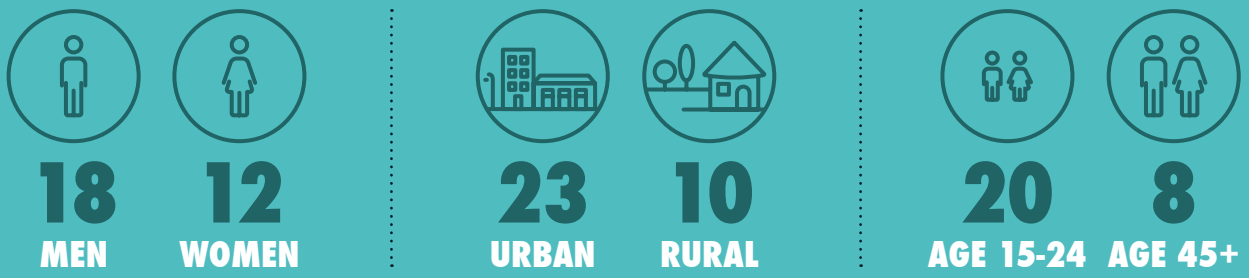
Third, the development and application of information capital (credit scores) for participants in this technological platform arose as companies started using the M-Pesa payment data including travel and communication patterns to determine the risk profile of customers and offer them loans at affordable rates, eliminating information asymmetry inhibiting the development of credit markets in Africa. This development was supported by already-existing credit information bureaus and amendments on information sharing to the Banking Act. Finally, cross-border payments and international remittances based on the M-Pesa technological platform have become possible aided by the National Payments Act, which allowed for standalone payments and settlement units including foreign exchange remittances. Now, the M-Pesa technological platform has revolutionized financial inclusion in Kenya to reach over 75 percent of the population and increase financial access touch points: 76.7 percent of the population are within five kilometers of a touch point, and there are 161.9 financial access touch points per 100,000 Kenyans compared to 63.1 in Uganda, 48.9 in Tanzania, and 11.4 in Nigeria.

FIGURE 3.1.

INTERNET AND MOBILE PHONE ACCESS IN AFRICA DIFFER GREATLY

Mobile phone access in sub-Saharan Africa has grown by leaps and bounds in the past decade: Almost 82 percent of all Africans had a cell phone in 2015. The internet, however, has not seen that sort of uptake, largely because of the infrastructure needed to provide it. Indeed, the world has an average of 209 internet servers per person and OECD members average 1087 servers per person, but the region averages only 10. Unsurprisingly, then, access to the internet remains low: Overall, only 15 in 100 Africans have access.

Digital divide: Who has access to the internet in sub-Saharan Africa? (percent)



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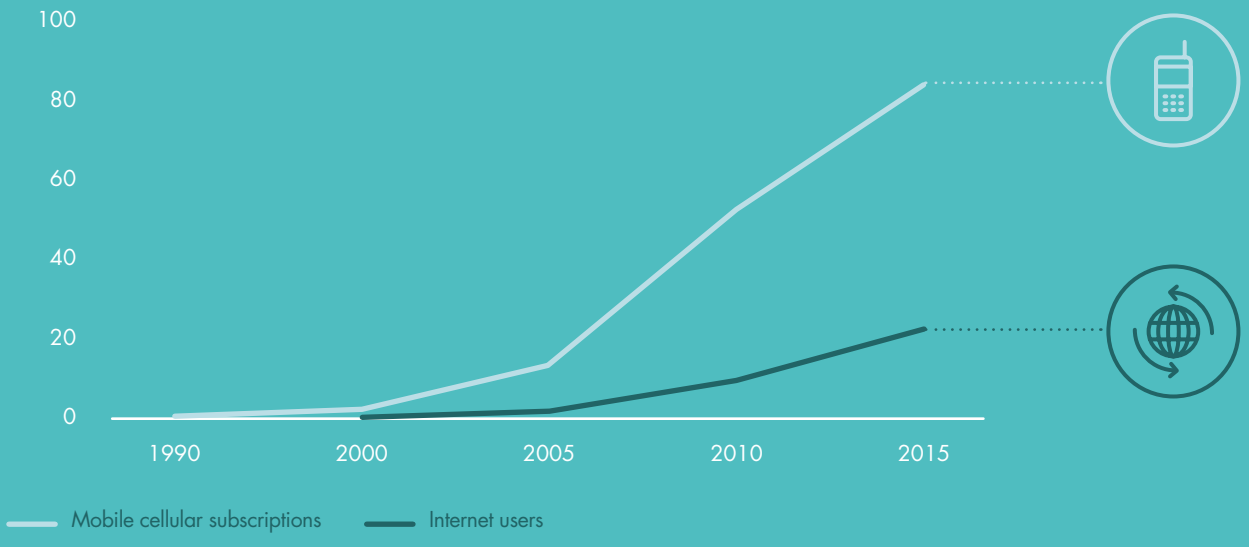
AVERAGE (INDIVIDUALS) FOR AFRICAN COUNTRIES

Source: World Bank. 2016. World Development Report 2016: Digital Dividends. Washington, DC: World Bank. Based on data from Research ICT Africa (various years), ITU, and Eurostat (EC, various years). Data available at http://bit.do/WDR2016-FigO_6.

Mobile cellular subscriptions and internet users in sub-Saharan Africa (per 100 people)

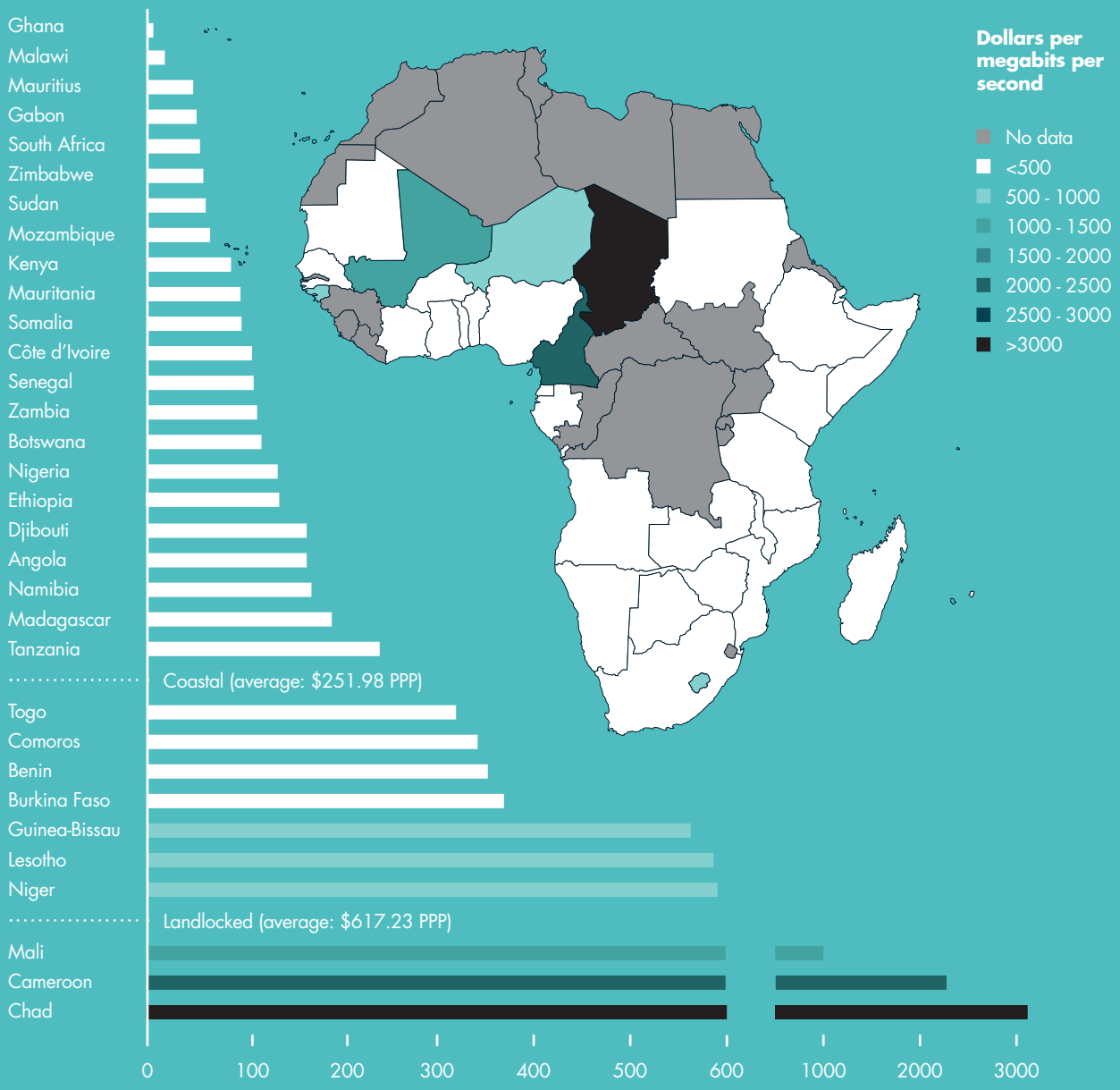


Source: World Bank World Development Indicators (2015).

FIGURE 3.2.

INTERNET PRICES CAN CONSTRAIN ACCESS

Internet prices in sub-Saharan Africa vary wildly, from $3037 per megabits per second (Mbit/s) in Chad to $8 in Ghana, though the region's average is $366 Mbit/s overall. A major trend, though, is how geography affects these prices, as landlocked countries pay an average $365 more than coastal countries per Mbit/s. Given that much of Africa recieves its internet via (albeit expensive) undersea cables, coastal countries have much easier access. New initiatives to provide internet via low-orbit satellites and high-altitude balloons offer the hope of more accessible, cheaper internet for all, though still have a long way to go when it comes to cost and reach.



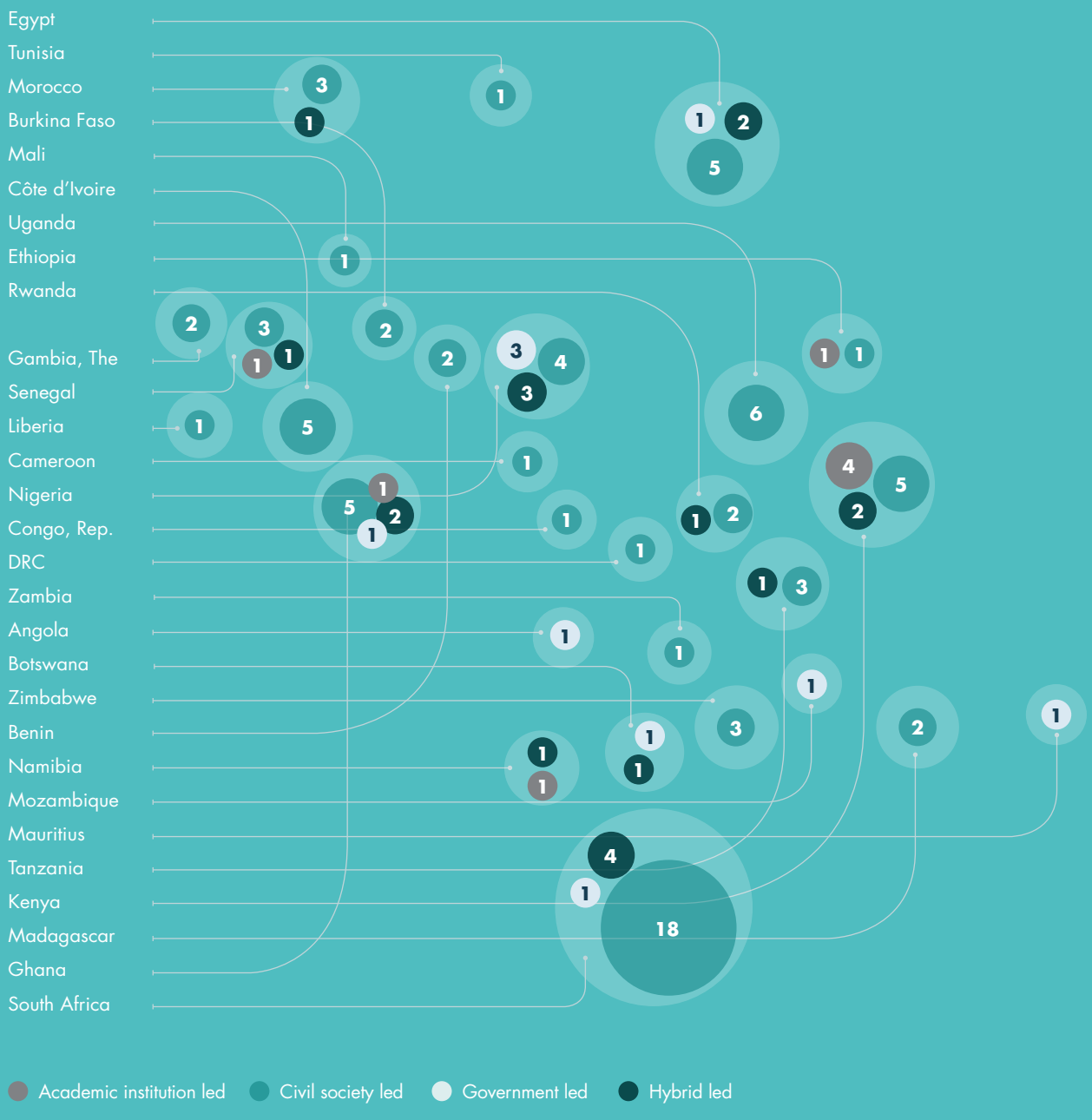
Note: Price per Mbit/s in US$ PPP a month in 2014 Q4/2015 Q1 for fixed, residential broadband service. Mbit/s = megabits per second; PPP = purchasing power parity.

Source: World Bank. 2016. World Development Report 2016: Digital Dividends. Washington, DC: World Bank. doi:10.1596/978-1-4648-0671-1. License: Creative Commons Attribution CC BY 3.0 IGO. Available at: http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf. Data URL: http://bit.do/WDR2016-MapB4_5_1.

FIGURE 3.3.

TECH HUBS IN AFRICA

Tech hubs, defined by the World Bank as "spaces mainly focused on developing a digital entrepreneurship ecosystem, or a network of engagement between digital entrepreneurs, designers, and potential investors," are popping up in Africa in different forms. These hubs enable the digital vanguard to gain skills and network through brainstorming sessions, workshops, and business- and technology-related trainings, among others. Notably, the great majority of these hubs—74 in fact—are civil society led. In sub-Saharan Africa, South Africa, Kenya and Ghana all boast a great number of tech hubs, but there are also many scattered across the continent.



Source: Firestone, R. and Kelly, T. *The Importance of Mapping Tech Hubs in Africa, and beyond.* 24 August 2016. World Bank Information and Communications for Development Blog. Available at: http://blogs.worldbank.org/ic4d/importance-mapping-tech-hubs-africa-and-beyond.

Going forward, what can regulators in Africa do to encourage the innovation revolution?

Products like M-Pesa cannot thrive if the regulators on both sides do not understand the potential of the innovations taking place to the totality of the economy as well as the risks.

Products like M-Pesa cannot thrive if the regulators on both sides do not understand the potential of the innovations taking place to the totality of the economy as well as the risks, and provide risk mitigation processes upfront—thus avoiding stifling emerging innovative products. Other countries in Africa that have followed similar paths even with different legal frameworks have been successful. Rules and guidelines should encourage prudent behavior by both the financial institutions and market participants. Regulators should manage the orderly entry and exit of financial institutions in the market, minimizing the potential for major disruptions in the financial system. This did not change when other regulators, like telecommunication (telco) regulators in Kenya, came to the scene; in that example, it strengthened the case for DFS and provided credibility with regulators working as a team.

So far, this pattern has worked well, but DFS platforms have brought other actors that are regulated differently into the marketplace, such as the fintechs and the telecommunication companies partnering with banks to provide access to financial services. What happens now, when such partnerships require different regulators and regulatory technology? In this case, regulatory technology must develop further, cope, and align with these new product designs and market actors. In the Kenyan case, M-Pesa is like a joint product between commercial banks and a telco (Safaricom), and other similar products have been developed and rolled out to the market in a similar way. These types of products sit in a commercial bank as a transactions platform and the telcos provide the technological transmissions of transactions to this platform. The regulators of banks and telcos then concentrate their efforts and guidelines along these *shared* responsibilities.

For further progress and increased uptake of transformative innovations in 2017 what is required is further improvement in the regulatory environment.

For further progress and faster financial inclusion in Africa in 2017—as well as increased uptake of other transformative innovations—what is required is further improvement in the regulatory environment, regulatory reforms as well as leveraging on successful cases to make the financial market more accessible, efficient, safe, and reliable to boost confidence and endogenously move financial inclusion to the next level. It is emerging in this way for example in East Africa.

The lessons are clear that a poor regulatory environment can be a major obstacle to innovations in the market and will constrain the speed of financial inclusion. In this regard, we can scheme out the role of regulations and what we may regard as a good regulatory environment. First, regulatory changes are needed to enable successful adoption and adaptation of innovations. In successful cases of DFS, regulators in telecos, central banks, and even competition encouraged adoption and use by steering a favorable environment for new products and enhancing their credibility. Second, the regulatory

environment as well as frontier regulatory technology being adapted in the financial sector improved financial inclusion. The success of financial inclusion and accessibility to the financial market is compatible with the developmental role of regulators in Africa. Finally, related policies must open and even encourage and incentivize the consumer base to take up the new technology. In the Kenyan case, by bringing the financially excluded into the banking system, it has enhanced consumer protection and has created a better environment for monitoring anti-money laundering (AML) and combating the financing of terrorism (CFT). More importantly, it has created a better environment for monetary policy.

From this example, we can also provide a more global picture of the urgency of such innovations and their potential for transforming the lives of millions. A McKinsey Global Institute Report (2016), *Digital Finance for All: Powering Inclusive Growth in Emerging Economies,*[1] recently recounted some of the achievements of this new technology:

- Digital finance has the potential to provide access to financial services for 1.6 billion people—more than half of whom are women—in emerging and developing economies.

[1] Manyika, J., Lund, S., Singer, M., White, O. and Berry, C. 2016. *Digital Finance for All: Powering Inclusive Growth in Emerging Economies.* McKinsey Global Institute. Available at: http://www.mckinsey.com/global-themes/employment-and-growth/how-digital-finance-could-boost-growth-in-emerging-economies.

EVENT TO WATCH

JANUARY 15-17, 2017

United Nations World Data Forum

At the recommendation of the U.N. Secretary-General's Independent Expert and Advisory Group on Data Revolution for Sustainable Development, Statistics South Africa will host the first U.N. World Data Forum (WDF) in Cape Town, South Africa in early 2017. The forum aims to coordinate the efforts of experts in statistics, measurement, data science, and information systems, with those of data users—including policymakers, academic communities, businesses, and civil society—in order to build capacities for leveraging data to make evidence-based policy decisions related to the 2030 Agenda for Sustainable Development. Topics for discussion will include innovative data sources and technologies, data governance and privacy issues, financing data collection and analysis, and data communication and visualization.

- It can increase the volumes of loans extended to individuals and businesses by $2.1 trillion and allow governments to save $110 billion per year by reducing leakage in spending and tax revenues.

- Financial service providers can benefit by serving $400 billion annually in direct costs while sustainably increasing their balance sheets by as much as $4.2 trillion.

- The overall boost to GDP in these economies can be $2.7 trillion by 2025, a 6 percent increase. The contribution would come from raised productivity of financial and non-financial businesses and governments with DFS.

However, the fears of regulatory arbitrage, risks, and misunderstanding of how innovations are taking place continues to prevent so many African regulators from embracing DFS as well as creating an environment for other innovations in the market to thrive. The tension of regulation and innovation perhaps reigns even into 2017. What should be done? Going forward, how is the balance to be achieved? Nothing seems to explain this better than the words of the late Sir Andrew Crockett after the global financial crisis:

> *But whatever the underlying causes [of the global financial crisis], public opinion rightly expects the regulatory environment to be reformed to prevent a repetition of the economic and human costs of the crisis. There is a natural desire in such circumstances for "more regulation." What is needed, however, is "better regulation," a regime that can more readily identify emerging vulnerabilities, that can properly price risks, and that strengthens incentives for prudent behavior. In some cases, this will require additional regulation; in others, a better-targeted use of powers that regulators already have.*[2]

Institutions define the rules of the game, generating a set of dynamic principles to guide the market of dynamic innovators and entrepreneurs.

What results can we look for or showcase where the balance of regulation and innovation has been seen to work? Do we assume that in 2017 the regulators, especially in Africa, will acquire and adapt the frontier regulatory technology that will balance out and encourage innovation, innovative products, and entrepreneurship? The Kenyan case demonstrates that entrepreneurs and innovations will thrive with a supporting policy and regulatory environment. Its successes would not have been possible without the strong regulatory institutions as institutions have two important functions: First, they define the rules

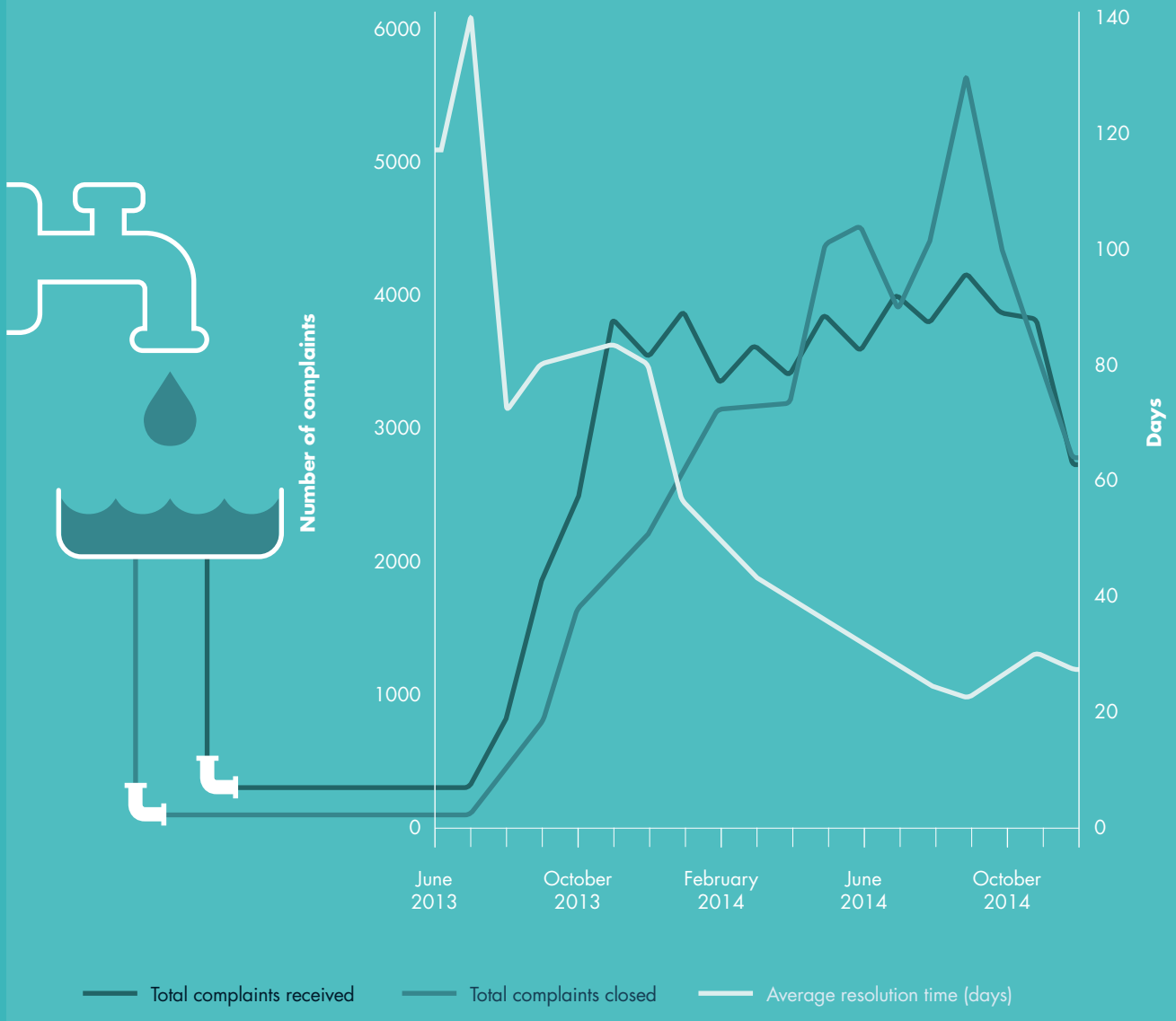
[2] "Rebuilding the Financial Architecture," *Finance & Development,* Volume 46, Number 3, September 2009. Available at: https://www.imf.org/external/pubs/ft/fandd/2009/09/pdf/crockett.pdf.

FIGURE 3.4.

AN EXAMPLE OF TECHNOLOGY IMPROVING SERVICE DELIVERY:

NAIROBI'S WATER UTILITY USING DIGITAL CUSTOMER FEEDBACK

Service delivery within urban areas goes beyond availability of goods; rather, efficiency and customer response is additionally central to a productive, well-functioning system. New forms of communication, such as digital customer feedback at a Nairobi water utility, corresponded with a marked increase in improved service delivery through the resolution of complaints. In this case, the mobile application MajiVoice provides customers the opportunity to register complaints via text message or internet. Not long after its introduction—June 2013—citizens were empowered to register complaints and those issues were resolved faster.



Source: World Bank. 2016. World Development Report 2016: Digital Dividends. Washington, DC: World Bank. doi:10.1596/978-1-4648-0671-1. License: Creative Commons Attribution CC BY 3.0 IGO. Available at: http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf.

of the game, generating a set of dynamic principles to guide the market of dynamic innovators and entrepreneurs. Second, they define the appropriate incentives (as well as penalties). A combination of rules, dynamic guidelines, and appropriate incentives will encourage prudent behavior in the market and will support market development. In this regard, innovators and entrepreneurs will find it easy and rewarding to operate and thrive in such a market and a regulatory environment.

This synergy is what will support innovation in the market and attract new entrepreneurs. But there are two important caveats to watch for in 2017. Financial stability—like so many other important drivers of growth—cannot be sustained by regulations alone. Other internal and external factors, such as an unstable macroeconomic environment and threats of recession, can threaten success. Economic recession robs the economy of the supply of investment opportunities and the financial sector thrives on this dynamism to allocate financial resources to affect the investments. In addition, capping interest rates destroys the instrument that is used worldwide to price risk. In this case, domestic de-risking is bad for financial stability as well as encouraging innovation and entrepreneurs in the market. A regulatory approach and a regulatory environment that will encourage innovation and entrepreneurship is what African economies should strive to achieve in 2017 but also work on the pitfalls that can disrupt the process that will kill innovativeness and broad-based growth across sectors.

Digital jobs and smart urbanization

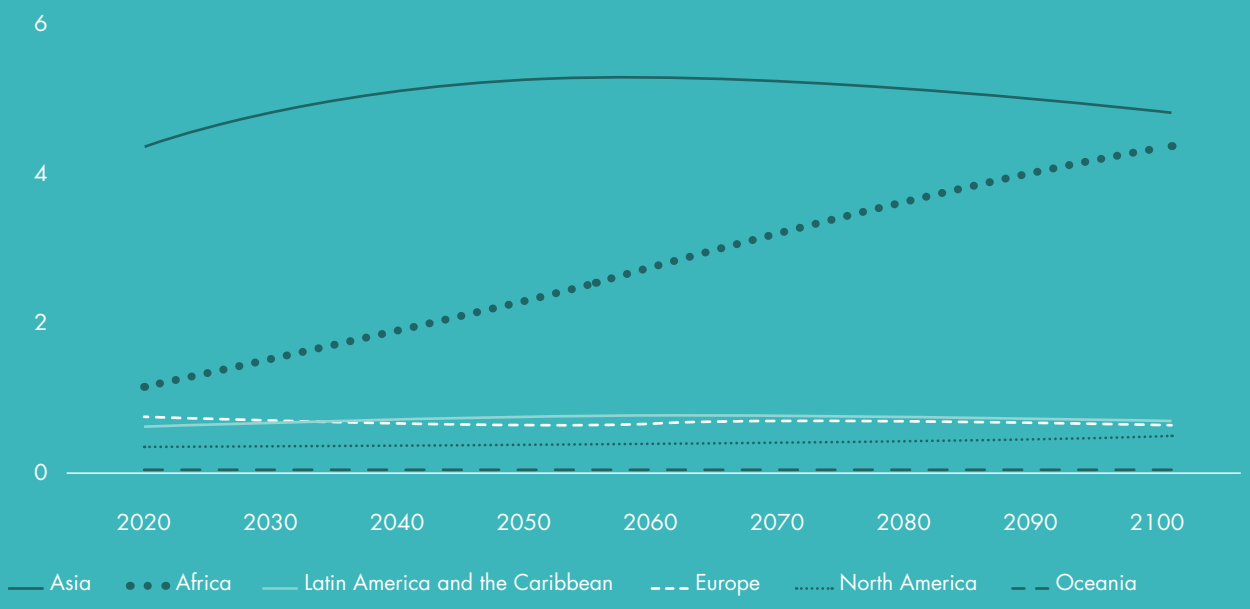
Given Africa's demographic boom and Africa's drive to play a more competitive role in the global economy, the question is not if digital jobs will play a role in Africa's future job market, but whether or not these jobs can be successfully used to catalyze growth, support innovation, and foster sustainable and resilient communities. The worldwide model of digital jobs has been configured largely to utilize low-cost, but tech-savvy, labor in developing countries to augment the staff of international ICT businesses rather than to supply a steady stream of jobs for its burgeoning population. While this trend can help foster the emergence and growth of a middle class in these countries, it also creates an inherent instability as other developing nations vie for (and can ultimately take away) those commodity-based digital jobs.

With all indications that urbanization trends will continue for decades in Africa, national governments

FIGURE 3.5. PROBABILISTIC POPULATION PROJECTIONS BASED ON THE WORLD POPULATION PROSPECTS

Africa's population will continue to boom at least for the next 100 years, far above much of the world, creating demand for new types of jobs.

Total population (both sexes combined) by country or area, 2020-2100 (billions)



Source: U.N. Medium-Variant Projection, 2015.

Adam Brown
Director of Infrastructure East Africa,
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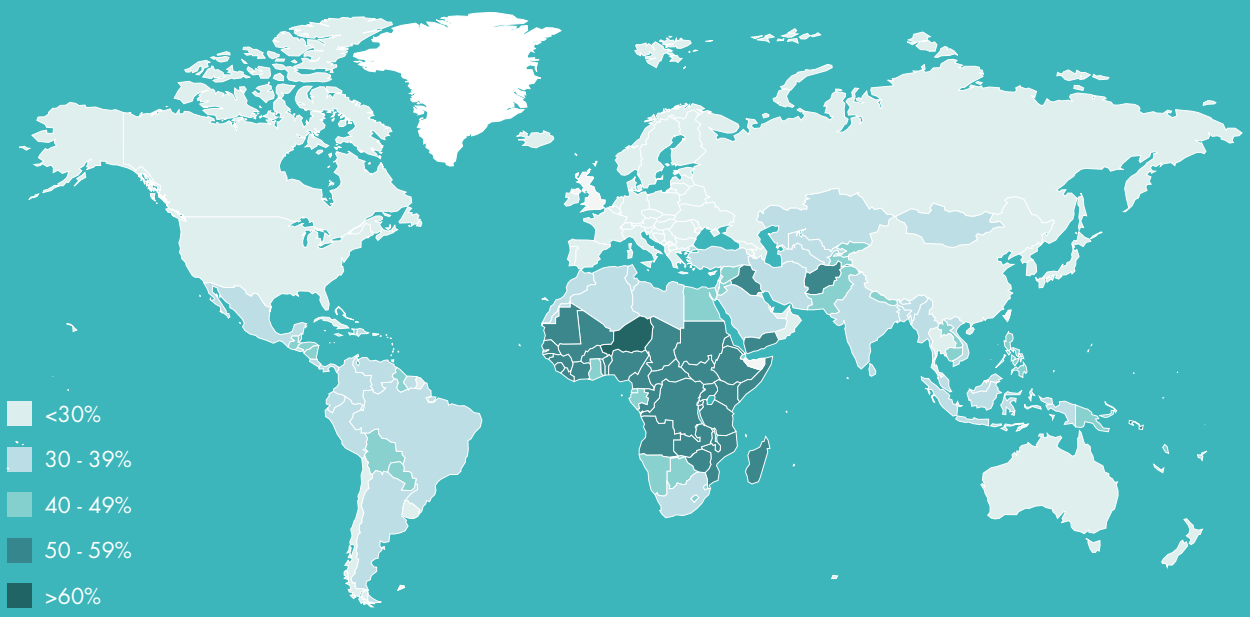
Director of Infrastructure,
Konza Technopolis Development Authority

should strive to create policy frameworks that help ensure endogenous and sustainable growth of digital jobs that are not solely outsourced to Africa from without. Further, policymakers should include digital jobs in an economic system that promotes productivity across the analog-digital spectrum. For example, technological innovations in agriculture can increase farming outputs, which affects jobs along the entire supply chain. Similarly, technological innovations in medicine can help ensure a healthy and therefore productive population. The overall effect is one where the preponderant application of technology at both the local and national economic levels significantly impacts the number of digital jobs generated from within the African economy.

One way to support digital jobs, especially in the wake of Habitat III resolutions in Quito, is through urban centers: In Africa, a higher proportion of the

FIGURE 3.6. PERCENTAGE OF COUNTRY'S POPULATION UNDER 20 YEARS OLD IN 2015

Not only will Africa's population boom, but the number of youth on the continent is already high, creating demand for strong, modern economies and new technologies to adapt the region to the changing world.



Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

youth population will reside in urban centers by the year 2040. When these centers serve as hubs for technology and innovation, all sectors of the economy, as well as all segments of the community, can benefit in a more meaningful way. Urban centers in Africa should strive to attract international technology businesses, which will contribute to an overall system that promotes science, technology, engineering, and mathematics (STEM) education, entrepreneurship, inclusion and accessibility, and ultimately more jobs for all sectors of the economy.

Given its position as the youngest and fastest-growing population in the world, Africa no doubt needs more digital jobs to support its population. But that those digital jobs should shore up an African-based technology economy is much more significant. Africa is in a unique position, and significantly so, to prepare its youth for more STEM-based jobs (including digital jobs) while building both urban and rural communities that promote productivity and innovation.

This will not happen by wishful thinking. It will happen through the deliberate and systematic strategies of progressive African governments with a long-term vision and the wherewithal to implement appropriate policies in technology and to provide and facilitate the necessary funding to create resilient, sustainable, innovative, and productive (let's just call it "smart") urban communities as well as efficient agricultural systems. As the concept of smart cities emerges in the world, Africa has a unique opportunity to take a new look at what the word "smart city" really means in the context of African urbanization in the digital age. Africa needs successful urbanization models that incorporate technology into the community fabric in a way that provides greater access to and benefits from technology across the socio-economic spectrum. Kenya is looking to do just that with its new smart city.

Konza Technology City and other smart cities in the developing world

Konza Technology City (KTC) of Kenya[1] is a new smart city being planned, designed, and built from the ground up. It is striving to be a model for combining urban master planning, technology, policy, and the rule of law to create a place that takes the word "smart" in its truest sense. While KTC is currently going through the steps of building a city—and all of the concrete, steel, and human resources that this entails—it is also asking, and endeavoring to answer, hard questions about how to make smart choices about the nexus of technology, jobs, creation, and urban planning.

Smart cities like Konza, and those in other parts of the world such as the Smart Cities Mission in India, must strive to play a major role in ensuring that technology and digital jobs help to bring people out of poverty and increase their physical and digital mobility. This is especially important in Africa where urbanization trends have not been contributing to the goal of transitioning people out of poverty to the degree that can and should be expected. When cities like KTC serve as innovation hubs—where people live, work, and play—the community extends well beyond the physical borders of the city. When smart cities create digital jobs by way of innovative technology, especially in life sciences and agriculture, it creates jobs across all sectors of the economy, which ensures that digital jobs are part of the solution—not the solution itself.

[1] Konza Technology City (KTC) of Kenya, available at: http://www.konzacity.go.ke/.