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# African Megacities as Emerging Innovation Ecosystems

## Faculty Research Working Paper Series

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# **AFRICAN MEGACITIES AS EMERGING INNOVATION ECOSYSTEMS**

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## **Abstract**

The unprecedented population growth in Africa and its projections followed by a high rate of urbanization are resulting in a growing number of huge urban agglomerations – cities and megacities. That phenomenon creates opportunities for the continent, but it also raises concerns about low levels of development and diminished quality of life among the majority of urban residents. African cities are characterized by overcrowding, poor infrastructure, and limited connectivity to the international economic system. They are essentially underperforming as potential centres of creativity and innovation. This paper argues that despite these challenges, Africa’s emerging megacities can unleash their potential as drivers of economic transformation if they can be viewed and managed less as static administrative regions and more as dynamic innovation ecosystems rather than a collection of discrete geographical enclosures that encroach on each other and neighbouring regions without adequate urban planning.

## **Introduction**

The emergence of megacities represents a new phenomenon of the 21st century, occurring on a rapidly growing scale, especially in Africa with surging population numbers and rapid urbanization. It brings both numerous challenges and opportunities to the economic development of nations and world development at large. They very much depend on the conditions in which these agglomerations are being formed, and do differ especially between

developed and developing countries. In that respect, African megacities face particular challenges resulting on one hand from overcrowding and on the other from low levels of development, such as infrastructure and institutional shortages, urban poverty, and limited connectivity to the international economic system, among other factors. Consequently, they underperform as potential hubs of creativity and innovation. The paper argues that despite the existing challenges African emerging megacities can unleash their potential as drivers of economic transformation if they can be viewed and governed as dynamic innovation ecosystems.

To support this argument the paper first briefly examines Africa's economic prospects. Next it advances the concept of megacities as innovation ecosystems that drive economic transformation. This is followed by an analysis of population growth and urbanization trends, focusing on the rise of megacities and their challenges and opportunities. The paper uses case studies of Lagos and Johannesburg to illustrate the importance of reforms in urban governance in repositioning megacities to become innovation ecosystems. It concludes with lessons learned from the cases for emerging megacities leaders who are interested in shaping megacities as innovation ecosystems.

## 1. Africa's economic prospects

The first decade of the 21st century marked the beginning of the new African economic narrative. The dynamics of economic growth and development observed in numerous African countries showed discernible potential, generating interest and discussion among researchers and policymakers worldwide.<sup>1</sup>

While the average rate of economic growth in sub-Saharan African countries during 1988–1997 amounted to 2.3%, it rose to 4.3% in the next decade. Economic growth intensified after 2004, when the rate exceeded 7%. This acceleration of growth in sub-Saharan Africa persisted in the years 2004–2014 at a level of about 5.7%, a more than twofold increase in growth compared to the average from the previous decade. In many African countries from 2007 to 2014 economic growth exceeded 5% (Zambia, Nigeria, Mozambique), and even maintained a level of 7–10%, for example in Angola or Ethiopia.<sup>2</sup>

Sub-Saharan Africa's GDP growth in the years 2007–2014 was more than five times the average for developed countries. The region recorded higher rates of economic growth than the Middle East and North Africa, South America, and the Caribbean. It came second to Asian countries, fluctuating around an average of 8% (the last three decades remain unchanged).<sup>3</sup> The dynamics differed depending on the region of Africa, as well as across

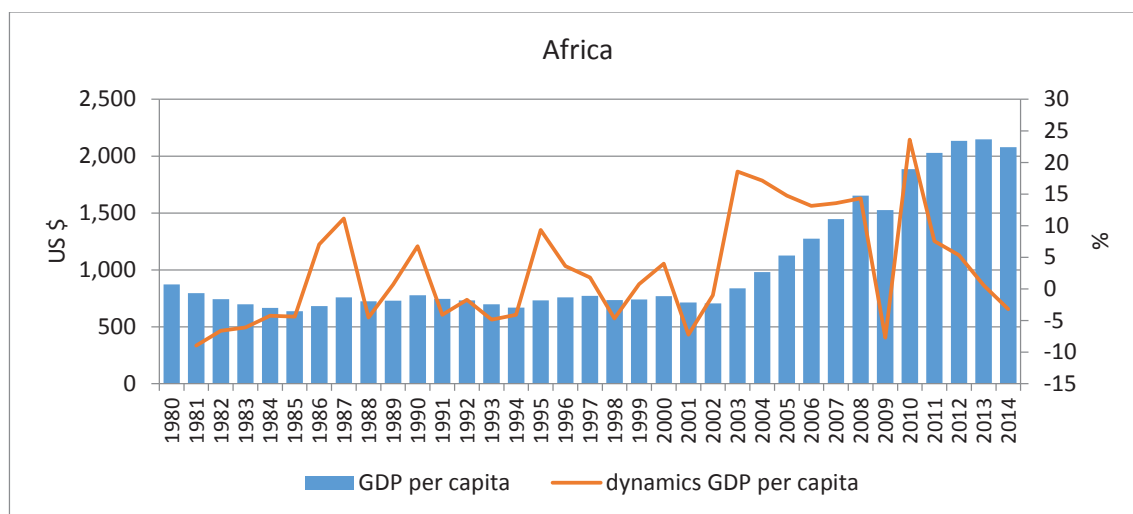
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<sup>1</sup> Aryeetey, E., S. Devarajan, R. Kanbur and L. Kasekende (Ed.) (2012). *The Oxford Companion to the Economics of Africa*. Oxford: Oxford University Press; Nawrot, K.A. (2014a). *Kraje rozwijające we współczesnej gospodarce światowej. Przyczynek do ekonomii rozwoju*. Warszawa: Wydawnictwo Naukowe Scholar; Monga, C. and J.Y. Lin (Ed.) (2015a). *The Oxford Handbook of Africa and Economics. Volume I: Context and Concepts*. Oxford: Oxford University Press; Monga, C. and J.Y. Lin (Ed.) (2015b). *The Oxford Handbook of Africa and Economics. Volume II: Policies and Practices*. Oxford: Oxford University Press; and Rynarzewski, T., K.A. Nawrot, K. Zajączkowski and E. Cieślak (2017). *Potencjał gospodarczy i możliwości rozwojowe Afryki. Polska perspektywa*. Warszawa: Polskie Wydawnictwo Ekonomiczne.

<sup>2</sup> IMF (2006). *World Economic Outlook 2006. Financial systems and economic cycles*. September. IMF: Washington DC.; IMF (2012). *World Economic Outlook 2012. Growth resuming, dangers remain*. April. IMF: Washington DC.; And IMF (2015). *World Economic Outlook. Adjusting to lower commodity process*. October IMF: Washington DC.

<sup>3</sup> See IMF (2015). *World Economic Outlook. Adjusting to lower commodity process*. October IMF: Washington DC.

countries. The increase in GDP and in GDP *per capita* was further recorded in the last decade, compared to the rather stagnant situation in both 1980s and 1990s of the 20th century (see Fig. 1).

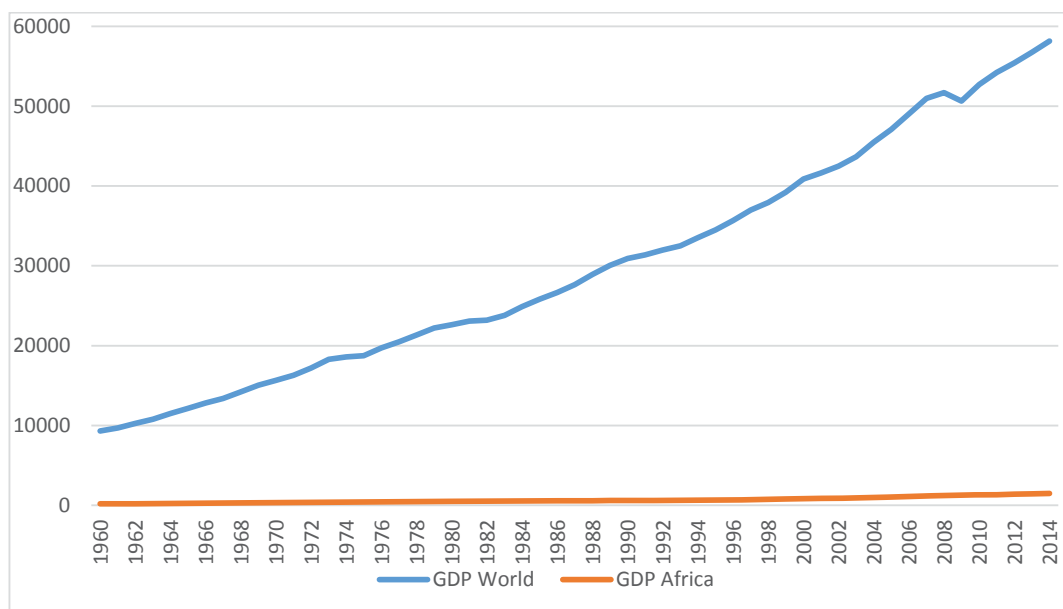


**Fig. 1. GDP per capita and its dynamics in Africa in 1980-2014**

Source: authors' own calculations based on WDI (2016).

Despite the observed changes, sub-Saharan African countries remain at a very low level of development. The least developed countries are almost exclusively on the continent of Africa. Changes in world GDP and GDP of Africa show a growing development gap (see Fig. 2), mainly due to progress in developed economies and emerging markets, predominantly in Asia.

The unprecedented increase in the level of knowledge and new technologies contributed to the current transformation of the global economy, as well as to the widening gap between countries. The key question is how Africa can use its potential as a latecomer to catch up in economic performance using technological innovation. This raises additional questions about how to utilize the potential of demographics, rising urbanization, natural resources, and relations with developed countries and emerging markets. Answering these questions requires a better understanding of the continent's urbanization dynamics. Of particular interest is the role of cities in general and megacities in particular.



**Fig. 2. Evolution of the world GDP and GDP of Africa in 1960-2014 (billion USD)**

Source: authors' own calculations based on WDI (2016).

## 2. Cities as innovation ecosystems

Cities have always been hubs and sources of productivity, innovation, economic growth, and development. Megacities encompass a larger share of the cumulative population, not only in terms of bigger numbers of people, but also more talent, ideas, innovative thoughts, and possibilities. They offer space for more communication, interaction, cooperation, and competition between different cities and stakeholders, cumulating and accelerating the knowledge, while creating the space for vast capabilities for creativity and innovation. Following an evolutionary economics approach pioneered by Joseph Schumpeter,<sup>4</sup> innovation refers to both a result, as well as a process leading to that result, associated with the formation of a new product, an innovative method of production or delivery, a new market, the acquisition of new resources, or the implementation of new organisational solutions. Based on that, the definition of innovation used by OECD in the Oslo Manual categorises innovation into technological (including product and process innovations) and nontechnological applications (containing organisational and marketing innovations).<sup>5</sup>

The innovation literature refers to management research and the level of an enterprise or industry.<sup>6</sup> Numerous researchers have also explored the innovation capabilities of nations,

<sup>4</sup> Schumpeter, J. (1934). *The Theory of Economic Development*. Cambridge: Harvard University Press.

<sup>5</sup> OECD (2003). *Oslo Manual, Guidelines for collecting and interpreting innovation data*, 3rd edition. OECD Publishing.

<sup>6</sup> Fan, P. and H. Gao (2016). Catching up and developing innovation capabilities in China's telecommunication equipment industry. In Z., Yu, W. Lazonick, Y. Sun (Ed). *China as an Innovation Nation*. Chapter 8, pp. 215-239. Oxford: Oxford University; Lee, K. and Ch. Lim (2001). Technological regimes, catching-up and leapfrogging: findings from the Korean industries. *Research Policy* 30, 459-483; and Mu, Q. and K. Lee (2005). Knowledge diffusion, market segmentation and technological catch-up: The case of the telecommunication industry in China. *Research Policy* 34, 759-783.

including technological change and the resulting possibilities of leapfrogging or catching up.<sup>7</sup> In the case of cities, social innovation is also important.<sup>8</sup>

Glaeser points out that despite numerous challenges cities enable their inhabitants to learn from each other in a complex world, building on each other's ideas and powering humanity's progress.<sup>9</sup> Richard Florida shows that cities are characterised by high levels of diversity, social mobility, and tolerance. When combined with the stock of talent and advanced technologies, cities create a background for creativity for its communities, determining the comparative advantage of urban networks at both national and international levels. He defines a paradigm of a creative class, arguing—in favour of cities' potential—that this class contains individuals who, through their creativity, add value to the place they live. The creative class refers to the social and cultural preferences associated with consumption, such as the buying behaviour related to daily good, and through ways of spending free time. Those defined as the creative class seek prosperous, diversified societies, and a place with rising employment opportunities and more inhabitants. The characteristic feature of a creative class is its engagement in creating new useful forms, usages, and services. Thus, the creative class should be perceived not in terms of welfare status but of intellectual potential.<sup>10</sup>

Florida defines a creative class through two components: a super creative core and creative professionals. In the first category belong scientists, engineers, academic scholars, writers, architects, artists, and researchers, among others. Their role refers, beyond their work, to a constant search for innovative solutions. The second category includes professionals whose occupation is based on the use of diversified and interdisciplinary knowledge and combining standard solutions in nonconventional manner. The group includes technicians, financial advisors, medical personnel, managers, or entrepreneurs.<sup>11</sup>

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<sup>7</sup>Gerschekron, A. (1962). *Economic Backwardness in Historical Perspective*. Cambridge: Harvard University Press; Abramovitz, M. (1986). Catching Up, Forging Ahead, and Falling Behind. *Journal of Economic History*, Vol. XLVI, No. 2. 385-406; Minami, R. (1986). *The Economic Development of Japan: A Quantitative Study*. 1st Edition. Basingstoke: Macmillan; Kleer, J., M. Perczyński and Z. Dobosiewicz. (1989). Z doświadczeń rozwoju skokowego. Warszawa: Państwowe Wydawnictwo Ekonomiczne; Hobday, M. (1994). Technological Learning in Singapore: A Test Case of Leapfrogging. *The Journal of Development Studies*, Vol. 30, No. 3, 831-858; Wang, J.-H. (2007). From Technological Catch-Up to Innovation-based Economic Growth: South Korea and Taiwan Compared. *Journal of Development Studies*, Vol. 43, No. 6, 1084-1104; Suehiro, A. (2008). *Catch-up Industrialization. The Trajectory and Prospects of East Asian Economies*. Singapore: NUS Press; Fu X., C. Pietrobelli and L. Soete (2010). The Role of Foreign Technology and Indigenous Innovation in the Emerging Economies: Technological Change and Catching-up. *World Development* Vol. 39, No 7, 1204-1212; Juma, C. (2010). *Science, Technology and Innovation for Development*, Presentation to the Policy Organs of the Common Market for Eastern and Southern Africa, 21 August to 1 September, The Royal Kingdom of Swaziland; Lee, K. (2013). *Schumpeterian Analysis of Economic Catch-up. Knowledge, Path-Creation, and the Middle-Income Trap*. New York: Cambridge University Press; Juma, C. (2011a). *The New Harvest. Agricultural Innovation in Africa*. New York: Oxford University Press; Juma, C. (2014). Complexity, Innovation, and Development: Schumpeter Revisited. *Policy and Complex Systems*, Volume 1, Issue 1, Spring.

<sup>8</sup> Among others, see Heden, C.G., and A. King (ed.) (1984). *Social Innovations for Development*. Oxford: Pergamon Press; or Mulgan, G. (2006). The process of social innovation. *Innovations. Technology, Governance and Globalization*, Vol. 1, No. 2, Spring, 145-162.

<sup>9</sup> Glaeser, E. (2011). *Triumph of The City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, And Happier*. London: Macmillan.

<sup>10</sup> Florida, R. (2002). *The Rise of the Creative Class*. New York: Basic Books.

<sup>11</sup> Florida, R. (2002). *The Rise of the Creative Class*. New York: Basic Books.

The concept of the creative class underlies the changing character of the global economy and the growing supremacy of services. Therefore, those creating new ideas are also active participants in daily life, accelerating creativity and innovativeness of a place they live, which mostly refers to cities.

Domański points out that the diversity of a space extends the possibilities and with a higher degree of freedom of behaviour creates a mechanism that generates microdiversity of its elements.<sup>12</sup> This in turn accelerates the development of the existing structure of the system, wherein the new structures are further formed, and the system becomes one with varying structural diversity. These changes are a source of new behaviors that can lead to sudden, abrupt transformations. In this way the system is enhanced with new features, which allow it to move into new dimensions.

The potential of cities and megacities shows their growing political power and comparative advantage compared to nation states. This tendency was underpinned by Ohmae,<sup>13</sup> indicating the dominant role of regions and megaregions. The emergence of such structures is largely determined by transportation and communication networks. This led to the definition of megalopolis<sup>14</sup> as cities corridors—e.g., Boston-New York-Washington; and of megapolitan areas as networks of clusters around metropolis exceeding 10 million inhabitants<sup>15</sup> or even megaregions. All the above-mentioned structures benefit from the growing concentration of talented people, which is further enhanced and enabled by transportation and connectivity.

As megacities become growing hubs for knowledge, information, and innovation, they determine their own productivity and competitiveness. The process of creating and accelerating knowledge use as well as the role of education become important. Human capital very much depends on the education system that exists in a particular location, which in turn influences the productivity and welfare of that location. Consequently, products of an education system determine and are determined by the quality and character of the education of the population and workforce. High qualification of a workforce builds capabilities of a local economy and increases its effectiveness, influencing the structure of employment and further spurring the demand for qualified workforce. Further synergies can be observed as the process continues to accelerate the upgrading of the existing education system.

Innovations can be used in megacities in numerous dimensions to spur their sustainable development. On the other hand, cities—which concentrate people and talents as well as technology parks, institutes, corporations, and universities—can further enhance innovativeness. Cities attract more talent and creative individuals if they provide an enabling environment, which includes education possibilities, business environment, culture, air quality, transportation, and connectivity. That leads to the view that megacities can be

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<sup>12</sup> Domański, R. (2012). *Ewolucyjna gospodarka przestrzenna*. Poznań: Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu.

<sup>13</sup> Ohmae, K. (1995). *The End of a Nation State – The Rise of Regional Economies*. New York: McKinsey&Company.

<sup>14</sup> Gottman, J. (1961). *Megalopolis – The Urbanized Northeastern Seaboard of the United States*. New York: The Twentieth Century Fund.

<sup>15</sup> Lang, R.E. and D. Dhavale (2005). *Beyond Megalopolis: Exploring America's New „Megapolitan” Geography*, Metropolitan Institute Census Report Series, Census Report 05:01.



perceived not only as grounds for innovation and innovation ecosystems but as innovation ecosystems themselves.

Though the ‘ecosystem’ concept was originally derived from the biological sciences, it can be applied in a variety of contexts, including management research or innovation.<sup>16</sup> The notion of ‘ecosystems’ provides a suitable metaphor for describing and analysing a range of value creating interactions and relationships between sets of interconnected organisations.<sup>17</sup> Even more broadly participants, actors, and elements within boundaries of a defined construct interact to constitute an ecosystem.

In management research the term ‘ecosystem’ usually refers to a network of interconnected organizations that are linked to or operate around a focal firm or a platform.<sup>18</sup> Building on that concept and relating it to innovation, Autio and Thomas<sup>19</sup> define innovation ecosystem as a network of interconnected organizations, connected to a focal firm or a platform. The network incorporates both production and use-side participants and creates and appropriates new value through innovation. In addition, a number of researchers apply innovation system or ecosystem to the analysis of nations,<sup>20</sup> or a region.<sup>21</sup>

A megacity innovation ecosystem can be defined as a *network of interconnected institutions, actors, and participants connected to a defined platform of an urban agglomeration of a megacity with ability to interact, adopt, and evolve within its diverse environment by creating new structures, forms, and value that enable the system to evolve to new levels.* Given the diversity of megacity ecosystems, the high degree of freedom of behavior of its participants and interactions, the system is enhanced with new features that allow it to move to new dimensions, as desired direction of megacities development. This definition shares a number of attributes with the broader concept of “clusters of innovation.”<sup>22</sup>

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<sup>16</sup> Dongson M., D.M. Gann and N. Phillips (Ed.) (2015). *The Oxford Handbook of Innovation Management*. Oxford: Oxford University Press; Dalohoun, D.N., A. Hall and P. Van Mele (2009). Entrepreneurship as driver of ‘self-organizing system of innovation’: the case of NERICA in Benin. *International Journal of Technology Management and Sustainable Development*, Vol. 8(2), 87-101; and Chaturvedi, S. (2007). Exploring Interlinkages between National and Sectoral Innovation Systems for Rapid Technological Catch-up: Case of Indian Biopharmaceutical Industry. *Technology Analysis & Strategy Management*, Vol. 19(5), 643-57.

<sup>17</sup> Autio, E. and L.D.W. Thomas (2015). Innovation ecosystems. Implications for Innovation Management? In M. Dongson, D.M. Gann and N. Phillips (Ed.). *The Oxford Handbook of Innovation Management*. Oxford: Oxford University Press, 204-228.

<sup>18</sup> Moore, J.F. (1996). *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*. New York: Harper Business; and Teece, D.J. (2007). Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*, 28, 1319-50.

<sup>19</sup> Autio, E. and L.D.W. Thomas (2015). Innovation ecosystems. Implications for Innovation Management? In M. Dongson, D.M. Gann and N. Phillips (Ed.). *The Oxford Handbook of Innovation Management*. Oxford: Oxford University Press, 204-228.

<sup>20</sup> Ebner, A. (2007). Public Policy, Governance and Innovation: Entrepreneurial States in East Asian Economic Development. *International Journal of Technology and Globalisation*, Vol. 3, No. 1, 103-124; Ramstad E. (2009). Expanding innovation system and policy – and organizational perspective. *Policy Studies*, Vol. 30(5), 533-53; and Fagerberg, J. and M. Srholec (2008). National innovation systems, capabilities and economic development. *Research Policy*, 37(2008), 1417-35.

<sup>21</sup> Arvanitis, R. and E. Jastrabsky (2006). A Regional Innovation System in Gestation: Guangdong. *China Perspectives*, 63.

<sup>22</sup> See Engel, J.S. (2014). What are Clusters of Innovation. How do they Operate and Why are they Important? In J.S. Engel (Ed.). *Global Clusters of Innovation: Entrepreneurial Engines of Economic Growth around the World*. Northampton, MA, USA: Edward Elgar Publishing.



There are at least five interconnected dimensions that form the structure of a megacity innovation ecosystem and determine the quality in terms of its attractiveness and innovation potential. They are: entrepreneurship, education, environment, culture, and connectivity. Thus megacity ecosystems should function as self-accelerating their own creativity and innovativeness, and as magnets for attracting talents and innovation.

There are two interconnected hypotheses that apply to the African context. First, innovation can enhance the sustainable development of megacities. Second, megacities can stimulate the growth of innovation.

Participants in cities are crucial aspects of the ecosystem function. They include: city authorities, the private sector, academia, nongovernmental organizations, and other institutions and individuals/citizens. Relationships among participants in ecosystems are symbiotic, as they coexist and coevolve with the system. Significant interdependence between different participants is observed, determining stability and advancement of an ecosystem. Thus, megacity ecosystems are dynamic constructs, whose participants coexist and interact creating a new value and further evolution of the construct. Megacity innovation ecosystem dynamics arise from relationships and interactions between the participants. All megacity participants are active agents and depend on the dynamics arising from relationships and interactions between ecosystem participants. This sets the stage for creativity and innovation. As Basole notes, the characteristics of innovation ecosystems include their ability to adopt and evolve based on internal and external influences.<sup>23</sup> This ability, as shown in the next section, requires purposive intervention aimed at aligning various institutions with innovation objectives.

### 3. Urbanization trends

While analysing urbanization in Africa, a short overview of population growth on the continent draws particular attention. The population of the continent was estimated in 1950 at around 228.9 million. According to the United Nations, it is expected to exceed 2.4 billion in 2050. Furthermore, Africa's proportion of the world population is gradually increasing. It is expected to exceed 25% by mid-century. By the end of 21st—according to the medium variant of estimates—it will reach about 4.4 billion, accounting for 39.1% of the expected world population.<sup>24</sup> Africa is recording the highest rate of population growth, which in 2010–2015 was around 2.5%. This is mainly a result of high birth rates. The countries with the highest population growth rate include Nigeria, Zambia, Mali, Uganda, Gambia, Burundi, Tanzania, Chad, Somalia, and Angola. It is expected that in 2050 the most populous countries on the continent will include Nigeria (440 million), Ethiopia (188 million), Democratic Republic of the Congo (155 million), Tanzania (129 million), Egypt (122 million), and Uganda (104 million).<sup>25</sup>

In 2015 the population of Africa exceeded 1.22 billion, while the population of sub-Saharan Africa was about 1 billion, and North Africa exceeded 223 million.<sup>26</sup> This represented 13.6% and 3% of the world population respectively. The projected estimates

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<sup>23</sup> Basole, R.C. (2009). Visualisation of Interfirm Relations in a Converging Mobile Ecosystem. *Journal of Information Technology*, 24, 144-59.

<sup>24</sup> UNDESA (2015). *World Population Prospects: The 2015 Revision*, New York.

<sup>25</sup> UNDESA (2012). *World Population Prospects: The 2012 Revision*, New York.

<sup>26</sup> WDI (2016). *World Development Indicators*. World Bank Database.

mean that the African population will double by 2050, and further increase by 2 billion until 2100.<sup>27</sup>

Africa is a young continent with 60% of population under the age of 25 and 29% between 25 and 49 years old.<sup>28</sup> In this regard, the proportion of the working age population of Africa is expected to exceed the same indicators for India and China in 2035. Moreover, according to estimates by the UN, Africa's share of the working age population is expected to reach 18% by 2030 and 25% by 2050.<sup>29</sup> This means that the labor resources of African countries will double between 2010 and 2050. As a result, consumer demand will increase, especially from the growing middle class. Such projections indicate the high potential of the region, but also raise concerns. While it creates opportunities for economic growth, consumer demand, and potential markets for the goods and services of the world's producers, it can lead to a deepening of poverty, unemployment, instability, and population movement and migration within and outside the continent.

Along with the rise of population, the level of urbanization in Africa is growing, including a number of large agglomerations, cities, and megacities. This is another challenge for development opportunities observed in the 20th and 21st centuries, not only in Africa but in developing countries at large. The process of urbanization in developed countries leading to the growth of welfare of the people was incremental. At present, however—particularly in developing countries—we observe galloping urbanization. What this means is that providing public goods in fast-growing agglomerations takes place much more slowly. Cities are simply not logistically prepared for such a massive influx of people. It leads to a deepening of the developmental problems associated with social exclusion, the increase in urban poverty, and crime. Furthermore, it deepens the negative impact on the quality of life of the population arising from factors such as congestion and pollution.

Africa is projected to lead in the world urbanization of the 21st century. Cairo, Lagos, and Kinshasa are ranked as megacities, with estimated populations in 2015 of 18.8 million, 13.1 million and 11.6 million respectively. The projections show that the numbers will increase to 24.5 million in Cairo, 24.2 million in Lagos, and 19.9 million in Kinshasa. Furthermore, by 2030 the populations of Dar es Salaam, Johannesburg, and Luanda are projected to exceed 10 million. For Dar es Salaam and Luanda, it will mean doubling of the actual size of the cities inhabitants.<sup>30</sup>

The level of urbanization for the continent is growing constantly and reached 40% in 2015, compared to 15% in the 1960s. The number of people in urban areas is expected to be equal to that in rural areas by around 2040, and exceeding 80% by the end of the century.<sup>31</sup>

There are significant disparities in economic development and the distribution of wealth in Africa between urban and rural areas. As a consequence, there is growing migration to cities. This gives hope for improving the wellbeing of the people. But it also contributes to the expansion of slums and deterioration in living conditions.

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<sup>27</sup> UNDESA (2015). *World Population Prospects: The 2015 Revision*, New York.

<sup>28</sup> UNDESA (2015). *World Population Prospects: The 2015 Revision*, New York.

<sup>29</sup> UNDESA (2012). *World Population Prospects: The 2012 Revision*, New York.

<sup>30</sup> UNDESA (2014). *World Population Prospects: The 2014 Revision*, New York.

<sup>31</sup> UNDESA (2015). *World Population Prospects: The 2015 Revision*, New York.

One of the key problems from urban development is growing urban poverty and the increasing number of slums. Africa ranks highest in the world with urban people living in urban areas. Over 60% of people in sub-Saharan African urban areas live in slums. This number increased in the first decade of the 21st century, in particular in the Central African Republic, Ivory Coast, Malawi, Mozambique, Zambia, and Zimbabwe. For comparison, in East Asia the number of people in urban areas living in slums was estimated at around 28.2%, in South Asia at 35%, and in developing countries on average at 32.7%.<sup>32</sup>

The above-mentioned issues raise the dilemma of whether the projected population growth along with urbanization will be a dividend or a curse. Whether governments will manage to provide jobs, education, and the infrastructure needed to take advantage of emerging opportunities and productivity of the young and growing population remains an open question. Finally, the other question is whether cities and megacities will evolve into centers of creativity and prosperity contributing to the national wealth or will remain points of chaos and pathologies rather than progress.

One of the reasons behind the sluggish growth of African cities is their lack of connectivity to the rest of the world in terms of goods and services for trade on regional and international markets.<sup>33</sup> This, along with low capital investment caused by Africa's relative poverty and lower levels of GDP *per capita* at the acquired stage of urbanization, subsequently leads to a deepening of developmental problems and degradation of the public sphere of growing urban agglomerations.

African cities are not adequately serving as engines of innovation spurring technological change and entrepreneurship. What is more, the crucial role that innovation can play in transforming African cities falls short in policy and academic discussions thus far. One of the reasons for this might be the perception of the continent as being predominantly a consumer of imports and not a contributor to global manufacturing. It is therefore important to explore the potential of innovation in African megacities and to map the possible solutions areas arising from an increasingly urbanizing region.

#### **4. Illustrations from Lagos and Johannesburg**

##### ***4.1. Lagos***

###### Overview

The State of Lagos, which is distinct from the Lagos Metropolitan Area, is located in the southwestern zone of Nigeria. Despite being the smallest of Nigeria's 36 states, it is the most important state in the country and in West Africa. If it were a country, it would rank as the seventh largest economy in Africa, bigger than Kenya or Ivory Coast. Its GDP is estimated at US\$90 billion. The state includes the city of Lagos, the largest urban center in the country. It was the capital of Nigeria until 1991, when the federal administration was relocated to Abuja. The population of the city of Lagos was estimated at 16 million in 2015.

Despite the relocation of the federal capital to Abuja, Lagos has remained the country's main economic, social, and financial hub. It continues to serve as Nigeria's center

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<sup>32</sup> UN-HABITAT (2012). *State of the world's cities 2012/2013: Prosperity of cities*, New York.

<sup>33</sup> Lall, S.V., J. V. Henderson and A.J. Venables (2017). *Africa's Cities. Opening Doors to the World*. Washington DC: The World Bank.

for international and national communications. Most of the foreign corporations operating in the country are located in Lagos. It is a vibrant commercial and industrial center with two seaports, an international and local airport, and industrial estates located in Apapa, Ikeja, and Ilupeju. The economic base of Lagos includes manufacturing, service industries, banking, and telecommunications. It also includes fishing, mining, agriculture, forestry, and quarrying.

Lagos State is rich in resources such as bitumen, clay, crude oil, silica, and wood. It accounts for nearly 30% per cent of Nigeria's GDP. Five terminals and ports account for nearly 50% of the country's port income. This agglomeration of economic activities is mainly due to the relatively well-developed air, sea, and land transportation infrastructure. Lagos is also a major educational hub housing several federal, state, and private institutions of higher learning. This enables it to provide highly skilled manpower to the various industries.

The concentration of economic activities in Lagos State, its vibrant entrepreneurial culture, and connectivity with the rest of West Africa makes it a natural hub for innovation.<sup>34</sup> But more importantly, it has the key elements needed to shift rapidly from being an administrative unit of the country to an innovation ecosystem. In fact, Lagos State has historically functioned as an implicit innovation ecosystem by virtue of the density of and connectivity between the various economic activities. Being the country's main gateway with the rest of the world, it serves as a receptacle for new ideas as well as an outlet of innovative products originating from the country. The rise of the Nollywood film industry in Lagos is an illustration of the prospects of the state as a leading innovation ecosystem.

### Governing innovation

One of the most important elements in repositioning a megacity into an innovation ecosystem should be attributed to city governance. Important lessons in that respect can be drawn from the office of Babatunde Fashola, Governor of the city-state of Lagos from 2007 to 2015.

During his first term Governor Fashola undertook important projects regarding city and state infrastructure, transport, and connectivity. The government launched public works programs, which have included the construction of new highways, a commuter rail metro system, a bus rapid transport system with new bus routes, and West Africa's first suspension bridge.<sup>35</sup> Other initiatives also included improvements in slums and demolishing shanty towns while encouraging occupants to return to their rural villages.<sup>36</sup> Also, Fashola's government dedicated substantial funds to sanitation, affordable housing, and "beautification projects" involving the planting of trees and creation of public parks and installation of scores of solar-powered traffic lights across Lagos.<sup>37</sup>

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<sup>34</sup> Ogbu, O. and Adeoti, J. (2010). Science and Technology Development in Nigeria: Past Experiences and the Imperative of an Innovation Driven Economy. In S. Akande and A. Kumuyi (Ed.) *Nigeria at 50: Accomplishments, Challenges and Prospects*. Nigerian Institute of Social and Economic Research, Ibadan, Nigeria.

<sup>35</sup> Kaplan, S. (2012). City Development States: Why Lagos Works Better than Nigeria. Global Dashboard. Retrieved from <http://www.globaldashboard.org/2012/05/10/city-development-states-why-lagos-works-better-than-nigeria/> [access: 22.03.2017].

<sup>36</sup> Rice, X. (2012). Africa: Lessons from Lagos. *Financial Times*. Retrieved from <https://www.ft.com/content/8b24d40a-c064-11e1-982d-00144feabdc0> [access: 22.03.2017]

<sup>37</sup> Wernick, D. (2016). Innovation in Africa: A View from the Peaks and Hilltops of a Spiky Continent. In J. Haar and R. Ernst (Ed.). *Innovation in Emerging Markets*. New York: Palgrave Macmillan.

Among numerous initiatives this paper focuses on the InnovateLagos project initiated in 2011. The project was a result of a meeting between Governor Fashola and Calestous Juma at Harvard Kennedy School. In 2010 Governor Fashola visited Harvard Kennedy School to explore how to move Lagos State to a next level of performance after helping it improve its infrastructure and several other services. It is notable that from the colonial period, the history of Lagos had been largely a footnote on failed efforts and ensuring that infrastructure and other urban services kept up with population increase and influx. One of the responses to the pressure was to relocate the federal capital from Lagos to Abuja with the hope that this would result in the decongestion of the city. While federal functions moved to Abuja, Lagos remained the financial capital of Nigeria.

The Governor raised three important topics. The first was how a financial capital like Lagos could enhance its place on the global scene as a commercial gateway for Nigeria given the fact that the federal government controlled foreign relations. This question led to a discussion on how different cities or states around the world work with their federal ministries to establish their presence internationally. This is a common practice in the field of commercial diplomacy and did not represent a challenge to the authority of the federal government to conduct international diplomacy. Lagos is formidable economic force not just in Nigeria but in the region. If it were a country it would rank as the eight largest economy in Africa and the fifth in sub-Saharan Africa.

The second topic was about how to measure the achievements made during the Governor's tenure. The fact that the performance of urban services in Lagos had dramatically improved during the previous three years was widely acknowledged. The question was whether to spend the next few years working on performance impact without a clear characterization of baseline conditions. The third topic was how to find a solution to the piracy problem facing Nollywood, Nigeria's film industry. In 2009, Nollywood surpassed Hollywood as the world's second-largest feature film producer after Bollywood. Nollywood is the second-largest Nigerian employer and its combined box office revenue was US\$11.5 million in 2016, with about a third of ticket sales coming from Nigerian movies.<sup>38</sup>

The discussions concluded with the suggestion that 2010 be considered a baseline against which to shift Lagos from its initial focus on infrastructure to becoming a regional innovation hub building on the country's scientific and technological base.<sup>39</sup> This proposal could also address the first theme related to economic diplomacy.

### Fostering institutional innovation

In charting a way forward, it was decided that the best approach was to help build capacity among the leadership of Lagos State Government to manage the transition from infrastructure to innovation. Harvard Kennedy School ran an executive education program in Lagos in October 2010. It was led by Calestous Juma and included Professor Henry Etzkowitz of Stanford University and Professor John Adeoti of the Nigerian Institute of Social and Economic Research in Ibadan. The program was attended by 42 participants including State Government Commissioners (ministers), private sector executives, academia,

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<sup>38</sup> Corrigan, A. (2017). *Personal communication*, Cambridge, MA, USA.

<sup>39</sup> Ogbu, O. and Adeoti, J. (2010). Science and Technology Development in Nigeria: Past Experiences and the Imperative of an Innovation Driven Economy. In S. Akande and A. Kumuyi (Ed.) *Nigeria at 50: Accomplishments, Challenges and Prospects*. Nigerian Institute of Social and Economic Research, Ibadan, Nigeria.



and federal government representatives. It was preceded by a meeting between Calestous Juma and Nigerian President Goodluck Jonathan, who pledged his support for greater functional autonomy by states, a point that was reinforced at the executive training program by his designated representative.

The program was designed as an exploration and was not convened with presumption of outcomes. The curriculum included: innovation systems and development; states and regions as economic actors;<sup>40</sup> regional innovation systems;<sup>41</sup> technology and regional development; emerging technologies and regional development; slum upgrading; policy and institutional innovation;<sup>42</sup> and an open discussion on the way forward. Early in the program consensus emerged that shifting from the focus on infrastructure to innovation would require adjustments in the governance structure of Lagos State with the Governor's office play a key role in serving as a coordinator of the institutional adjustments.

It was agreed that the starting point would be to create the Lagos Innovation Council (LIAC), which would comprise representatives from government, business, academia, and relevant civil society. The body would report directly to the governor for action. Other organs were also envisaged to work on technology development and financing. An extensive exploration of how different countries structured their innovation systems was conducted and it was concluded that some of the elements of the Finnish system would serve as a good role model and source of heuristics. It became evident from the search that no major city in the world had created analogous organs, so Lagos would have to proceed in an experimental manner knowing it did not have other examples to emulate.

### LagosInnovate

The council met regularly and its first major task was to recommend the creation of the InnovateLagos as a partnership of the Lagos State Government and the private sector. Its goal was to nurture a sustainable innovation ecosystem across all sectors in Lagos with a mission to inspire and promote enterprise, research, and skills for innovation. The main target was to champion technological innovation, promote entrepreneurship, and technological dynamism.<sup>43</sup> The immediate objectives were crafted to build entrepreneurship and a favourable business environment and climate that would spur innovation across the city-state. These objectives included: developing an economic and business climate that rewards innovation; creating and supporting initiatives that took innovative ideas to the market; crafting enabling legislation and policies for innovation (covering human, physical and technological resources, strong networks to facilitate the flow of ideas, expertise and knowledge for innovation); and investing in research and innovation via grants, equity

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<sup>40</sup> Rodríguez-Pose, A. (2008). The Rise of the 'City-Region' Concept and its Development Policy Implications. *European Planning Studies*, Vol. 16, No. 8, 1025-1046; and Cooke, P. (2007). "To Construct Regional Advantage from Innovation Systems First Build Policy Platforms," *European Planning Studies*, Vol. 15, No. 2, pp. 179-194.

<sup>41</sup> Etzkowitz, H. and J. Dzisah (2008). Rethinking Development: Circulation in the Triple Helix, *Technology Analysis and Strategic Management*, Vol. 20, No. 6, 653-666.

<sup>42</sup> Lakshmanan, T.R. and Chatterjee, L. (2009). New Governance Institutions in the Entrepreneurial Urban Region. *Innovation – The European Journal of Social Science Research*, Vol. 22, No. 3, 371-391; and Wu, W. (2007). State Policies, Enterprise Dynamism, and Innovation System in Shanghai, China. *Growth and Change*, Vol. 38, No. 4, 544-566.

<sup>43</sup> Juma, C. (2011b). "Africa's New Engine." *Finance and Development*. New Africa. Retrieved from [http://www.belfercenter.org/sites/default/files/legacy/files/juma\\_finance\\_and\\_development\\_dec-2011.pdf](http://www.belfercenter.org/sites/default/files/legacy/files/juma_finance_and_development_dec-2011.pdf) [access: 15.03.2017].



funding, and match funding.<sup>44</sup>

To help implement the project, InnovateLagos Secretariat was founded and located in the Office of the Deputy Chief of Staff, Office of the Governor of Lagos under Ms. Moji Rhodes. Two crucial bodies continued to support implementation of the project were LIAC and the Lagos Research & Development Council (LRDC) which started their operations in 2011 and 2012 respectively. The principal goal of the LIAC—a 21-member body of government, private sector leaders, and academia—was to provide high-level advice to better target and generate effective programmes to focus and improve governments and industry support for innovation.<sup>45</sup>

The starting point in the terms of reference of the LIAC was to develop an innovation strategy and plan for Lagos State that the InnovateLagos office would execute. In particular, the strategy focused on elaborating and influencing policy initiatives to accelerate innovation in public service delivery. It was further critical to identify and review the major obstacles to innovation and to provide solutions that would enhance the economic and social development of a city-state. The crucial aspect of an effective implementation of the strategy was to link the private sector, public sector, and academia to raise their current levels of innovation performance and create the value added from the synergies of their collaboration. The Lagos State innovation agenda was to develop and champion both locally and abroad. Thus, a multidisciplinary and globally competitive approach to innovation was encouraged. To further support it, the leadership identified opportunities to work with other states and countries to influence and integrate prospective aspects to the national innovation agenda.<sup>46</sup>

The crucial pillars of the strategy included policy frameworks (Lagos Innovation Policy, Lagos Broadband Policy); building networks and collaboration through stakeholder mapping exercise and events; facilitating enabling infrastructure for spaces and broadband access (incubators and accelerators, co-working spaces, maker space); targeting education and capacity development through coding and robotics sessions for schools; technical and mentoring support for innovators and entrepreneurs; industry collaboration with secondary and tertiary institutions and R&D; and funding (Angel Funding, Lagos Innovation Fund).

Among the successful activities, the Council supported the launch of the Lagos Innovation Hotspot Map in collaboration with Co-Creation Hub (CcHub), providing investors and policymakers with data on innovation clusters within the city ranging from fashion to creative photography, tech start-ups, or financial services. Another initiative—Lagos Angel Network—linked entrepreneurs with potential investors to give impetus to businesses, while “Made in Lagos” was supporting Lagos innovators via grants for prototyping, testing and scaling, along with business support and mentoring. The initiative targeted tertiary institutions with industry-linked training programmes and secondary schools with innovation competition programme – IDEASLAGOS. These initiatives, as pointed out by Moules, have encouraged a wave of technology start-ups, earning Lagos the reputation of ‘Africa smartphone app capital.’<sup>47</sup>

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<sup>44</sup> Rhodes, M. (2017). *Personal communication*, Abuja, Lagos, Nigeria.

<sup>45</sup> Rhodes, M. (2017). *Personal communication*, Abuja, Lagos, Nigeria.

<sup>46</sup> Rhodes, M. (2017). *Personal communication*, Abuja, Lagos, Nigeria.

<sup>47</sup> Moules, J. (2014). “Apps Mean Jobs for Young Nigerians.” *Financial Times*. Retrieved from <https://www.ft.com/content/77df79a8-c716-11e3-889e-00144feabdc0> [access: 21.03.2017].

Besides these activities, the LIAC addressed culture, in particular the Nollywood movie industry through grants, capacity development, and distribution. One of the guiding principles for the selection of activities discussed at the 2010 executive program was to upgrade existing activities where Lagos could provide regional or international leadership. One obvious case was the film industry. Lagos, the home of Nollywood, views its film industry as an opportunity to promote its tourism and serve as Africa's premier hub for multimedia entertainment. Nollywood filmmakers, however, lost up to 80% of their profits through piracy. Attempts to find technical fixes to the problem were fruitful, so one way forward is to upgrade the technical capacity of Nollywood to stay ahead of the pirates rather than seek to eliminate the problem.

At the heart of Nollywood's woes lay the lack of professional training opportunities for filmmakers to increase their revenue and distribution. Access to continually improving digital equipment, evolving production techniques, and cutting edge distribution strategies were needed to improve film production. In 2012 Lagos State (through LagosInnovate and the Living Labs Global) partnered with Nollywood Workshops to design and implement the Nollywood Upgrade Project (Nollywood UP). The goal was to address the piracy challenge through training, capacity building, and innovation. It trained 150 Nigerian filmmakers in its inaugural five-day workshop. The Nollywood UP training team facilitated intensive workshops in cinematography, directing, production design, film and distribution business, screenwriting, editing, and acting. The workshops were designed by filmmakers for filmmakers, and they took into account the complex realities of filmmaking in Nigeria. The trainers included experts from Nollywood and Hollywood in the United States. To ensure that the training workshops met industry standards, the Nollywood UP team partnered with Boston University's Center for Digital Imaging Arts. The Nollywood UP Training illustrated enormous demand for technical media training in Lagos. Curriculum lectures, handouts, videos, equipment guides were created as resources made available to the Lagos State University for the development of its own film program.<sup>48</sup>

The second body, the Lagos Research & Development Council (LRDC), including ten members mainly from academia, was inaugurated by Governor Fashola in September 2012. Its aim was to strengthen R&D in tertiary institutions in Lagos through the administration of the Tertiary Institutions R&D Fund, whose purpose was to support research and development emanating from tertiary institutions ranging from arts and humanities to medicine and pharmacy, engineering and transportation, science and technology, environmental science and climate change, housing, agriculture, and other agro-allied projects. Furthermore, the fund provided higher education institutions with a platform to transform their ideas into commercial products and services for Lagos and facilitate collaborative partnerships with government, the private sector, and domestic and international research institutions.

The LRDC aimed to strengthen tertiary institutions' R&D capabilities through funding both ideas that will lead to the introduction of commercial products and projects that will foster strong domestic and international industry and academic partnerships. It led to further growth of new start-ups born out of tertiary institution R&D labs. Supporting various activities that help to develop the innovative capabilities of tertiary institutions for the private and public sector formed the partnership among the three stakeholders within the Triple Helix collaboration mode. Innovation capabilities and culture in higher education were gradually improving and along with various innovation programs stemming in the quality of learning,

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<sup>48</sup> Corrigan, A. (2017). *Personal communication*, Cambridge, MA, USA.

teaching, and graduate employability.

A notable LRDC initiative was a call for research proposals to tertiary institutions in Lagos State in November 2013. The call was published to meet the developmental goals of the state in line with its 2012–2025 Development Plan produced by the Ministry of Economic Planning and Budget. The ministry received 137 proposals, mainly from the fields of health (21%), education and training (16%), agriculture and agro-allied industries (10%), environmental science (9%) and power and energy (7%), among others.<sup>49</sup>

### Ecosystem activities

The active agent of innovation and a crucial component of innovation ecosystems is private sector itself with entrepreneurs adopting new technologies and information systems while providing new products and services for customers. One to mention is Jumia, initiated and founded in Lagos in 2012 and formerly known as Africa Internet Group (AIG). Jumia could be described as an ecosystem itself, embracing online commerce, marketplaces, and classifieds websites and applications. As internet start-ups and e-tailer, gradually expanding business both geographically across Africa, as well as regarding products and services offered to the modern age consumers Jumia is the leading actor of online commerce in Africa.

Besides, a wide variety of facilitation institutions is playing a critical role in innovation and innovation ecosystems.<sup>50</sup> They range from nonprofit organizations, multinational corporations to innovation hubs and tech accelerators. Already mentioned Co-Creation Hub (CcHub) serves as an important platform in that respect in Lagos and Nigeria at large. Established in 2010 with a support of Omidyar Network and UK-based nonprofit Indigo Trust CcHub is catalyzing innovation and creating solutions through a number of activities, including brainstorming sessions, workshops, lectures and mentoring services for entrepreneurs transforming their ideas into marketable products or solutions.<sup>51</sup>

As a result of these initiatives and its tangible results, Fashola's governance is considered and characterised as 'innovative governance'<sup>52</sup> and Lagos labeled as a role model for African cities.<sup>53</sup> We can conclude here that although the InnovateLagos project was in fact targeted at building innovation at the micro- and industry-level across Lagos State, Governor Fashola oversaw an inspirational experiment that sought to reposition the Lagos megacity as an innovation ecosystem. Trained as a lawyer, Fashola brought a culture of science and technology advice to his leadership. When Lagos was hit by the Ebola virus crisis in 2014, he appointed Dr. (Ms.) Adekemi Oluwayemisi Sekoni as his Chief Scientific Adviser to focus on controlling infectious diseases. At the time, Governor Fashola was

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<sup>49</sup> Rhodes, M. (2017). *Personal communication*, Abuja, Lagos, Nigeria.

<sup>50</sup> Wernick, D. (2016). Innovation in Africa: A View from the Peaks and Hilltops of a Spiky Continent. In J. Haar and R. Ernst (Ed.). *Innovation in Emerging Markets*. New York: Palgrave Macmillan.

<sup>51</sup> Udonkang, N. (2014). Co-Creation Hub (CCHub) – Transforming Ideas to Products or Solutions. Retrieved from <https://course.novoed.com/venture1-2014-2/reports/256479> [access: 22.03.2017].

<sup>52</sup> Wernick, D. (2016). Innovation in Africa: A View from the Peaks and Hilltops of a Spiky Continent. In J. Haar and R. Ernst (Ed.). *Innovation in Emerging Markets*. New York: Palgrave Macmillan.

<sup>53</sup> Kaplan, S. (2012). City Development States: Why Lagos Works Better than Nigeria. Global Dashboard. Retrieved from <http://www.globaldashboard.org/2012/05/10/city-development-states-why-lagos-works-better-than-nigeria/> [access: 22.03.2017]; and Rice, X. (2012). Africa: Lessons from Lagos. *Financial Times*. Retrieved from <https://www.ft.com/content/8b24d40a-c064-11e1-982d-00144feabdc0> [access: 22.03.2017].

possibly the only African head of state or federal government supported by a chief scientific advisor.

InnovateLagos activities moved to the Lagos Ministry of Science and Technology and the Lagos Ministry of Establishment, Training, and Pensions in 2014, ahead of the end of the Governor's term in May 2015. In November 2015 Fashola was appointed by President Muhammadu Buhari as the Federal Minister of Power, Works and Housing.

## **4.2. Johannesburg**

Johannesburg is the capital of South Africa's Gauteng Province and the seat of the Constitutional Court. We provide a history of the city and the region to show how economic analysis must be cognizant of history, context, and theory to be of practical use.<sup>54</sup> The history of the City of Johannesburg and current efforts at the city, regional and national levels do foster an innovation ecosystem.

### Overview

By 2013 the region had produced 40% of all gold extracted globally to date (valued at eight trillion dollars). Capabilities built up in this endeavor have provided a platform for ongoing innovation and strong institutions such as the University of the Witwatersrand (Wits), originally a mining school; the South African Bureau of Standards (SABS); and the Council for Scientific and Industrial Research (CSIR).<sup>55</sup> The capital-intensive nature of the extraction created a robust financial sector that produced 56% of GVA in 2013.<sup>56</sup> The finance sector's contribution had increased from 22% in 1996 to 32% in 2013; manufacturing had decreased proportionally from 20% to 16% but was still growing strongly. The financial and business services sectors had also become primary innovators in the digital technology space, though institutions such as the CSIR had developed software development expertise and a national Technology and Innovation Agency funded the commercial links between research and commercialisation.<sup>57</sup>

In recognition of the strong linkages between Johannesburg and the surrounding urban area, the Gauteng Province coordinated strategic planning and policy beyond the three top metros area under the Gauteng City Region (GCR) framework. The GCR reflected an understanding of the innovation and other agglomeration benefits of cities and ranked as the 30th largest in the world. The GCR's total population of 12.9 million produced 11% of Africa's total GDP and hosted 65% of Africa's total market capitalization on local exchanges.<sup>58</sup> Population and GDP per capita were expected to double before 2050. By these

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<sup>54</sup> Pieterse, E. (2016). Parks Tau's second act is reward for a job well done in Joburg. *Daily Maverick*. Retrieved from <https://www.dailymaverick.co.za/article/2016-10-24-parks-taus-second-act-is-reward-for-a-job-well-done-in-joburg/#.WOlrkRjURo4> [access: 28.03.2017].

<sup>55</sup> Harrison, P. and T. Zack (2012). The power of mining: the fall of gold and rise of Johannesburg. *Journal of Contemporary African Studies*, 30(4), 551–570.

<sup>56</sup> City of Johannesburg (2015). Economic Development Strategy of the City of Johannesburg. Retrieved from <http://www.joburg.org.za> [access 28.03.2017].

<sup>57</sup> Gauteng Department of Economic Development (2012). Gauteng Innovation and Knowledge Economy Strategy. (April). Available at: [http://www.saine.co.za/wordpress/wp-content/uploads/2012/10/gauteng\\_innovation\\_and\\_knowledge\\_economy\\_strategy.pdf](http://www.saine.co.za/wordpress/wp-content/uploads/2012/10/gauteng_innovation_and_knowledge_economy_strategy.pdf) [access: 29.03.2017].

<sup>58</sup> AfDB, OECD and UNDP (2016). *African Economic Outlook 2016: Sustainable Cities and Structural Transformation*, Available at: <http://www.oecd.org/countries/namibia/1826046.pdf>. [access 28.03.2017].

measures, it is clear that a significant portion of Africa's knowledge, capability and capital stocks were in and around Johannesburg.

A 2015 Brookings Institute Report compared the Gauteng City Region (GCR) with eight global peers such as the so-called 'gateway cities' of Istanbul, Mexico City, and Shenzhen.<sup>59</sup> The report labeled the GCR the powerhouse of African business and the de facto African capital of finance and technology. The report also pointed to the high presence of multinational corporation headquarters as evidence of gateway status.

## History

Paul Kruger, the president of the Afrikaner republic, declared Johannesburg (also now often referred to as Jozi, Joburg, and eGoli), a gold mining village in 1887, one year after local farmers discovered gold. The scientific community today agree that humankind had its origins in the area (a major driver of tourism in 2016) two millennia ago. When the farmers discovered gold, the region had a small population of Afrikaner and Bafokeng farmers. The Bafokeng people had been indigenous to the area since at least the 1500s and were farmers and metal workers with trade ties as far away as China. A period of ethnic warfare with the Ndebele had depopulated the area in the 1820s and Afrikaner settlers fleeing the British Cape Colony declared a republic in 1840, driving the Ndebele to present day Zimbabwe. The founding constitution of the Afrikaner republic stated that 'blacks and whites are not equal before God or state' and that foreigners could not own land.

The region of present-day South Africa was a patchwork of Afrikaner states; Basutho, Swazi and Zulu Kingdoms; and British colonies. The discovery of gold renewed interest from the British who had already fought against the Afrikaner and Zulu nations in separate wars. Johannesburg grew to a tented city of over 100,000 people within ten years of the discovery of gold attracting fortune-seekers from across Southern Africa and as far afield as Australia, California, China, and Russia. Much of the early growth was driven by speculation on the Johannesburg Stock Exchange, and British financial interests led to an ugly war that ended with the British taking control of Johannesburg in 1903.

Factors out of Johannesburg's control such as the size of gold deposits, global demand for the metal, and events such the World Wars contributed to the unlikely rise of an isolated industrial "city of gold." However, through an innovation ecosystem lens, we see how early Johannesburg developed a particular culture of innovation and enterprise that drove growth from the bottom up. This rough but open culture persists today and often stood in stark contrast to the closed tribal and nationalism of the rest of South Africa throughout its history. Harrison and Zack's paper, "The Fall of Gold and the Rise of Johannesburg,"<sup>60</sup> and Van Onselen's "New Babylon New Nineveh,"<sup>61</sup> are rich accounts of this history and document a vast array of technological, social, and industrial innovations from all sectors, races, and socioeconomic groups. These range from the structure of the stock exchange and

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<sup>59</sup> Parilla, J. and J. Trujillo (2015). *South Africa's Global Gateway: Profiling the Gauteng City Region's International Competitiveness and Connections*. Retrieved from <https://www.brookings.edu/research/south-africas-global-gateway-profiling-the-gauteng-city-regions-international-competitiveness-and-connections/> [access: 28.03.2017].

<sup>60</sup> Harrison, P. and T. Zack (2012). The power of mining: the fall of gold and rise of Johannesburg. *Journal of Contemporary African Studies*, 30(4), 551–570.

<sup>61</sup> Van Onselen, Ch. (1982). *New Babylon New Nineveh. Everyday Life on the Witwatersrand, 1886-1914*. Johannesburg: Jonathan Ball Publishers.



local property development to mining innovations in chemical and explosives and labor unions and associations. The development of rapid integration of systems for sanitation, labor, electricity, transport, and even the “underworld” networks of taverns and brothels created a platform on which Africa’s leading urban economy could develop. These authors also highlight the diversity of the early city, and the proximity in which people lived and worked.

The labor-intensive quality of the industrialization created persistent labor shortages until the 1970s, and the ability of the local industry to keep wages low shifted disproportionate value to profits rather than workers, and much of these profits were passed on to international capital. This labor dynamic and pervasive racism in European settler, colonial, and then apartheid political systems produced high inequality in development outcomes between residents. Migrant labor was attracted to Johannesburg from around the world; laborers were recruited from neighboring countries or coerced off communal lands through rural tax schemes. Black Africans, in particular, faced racially targeted wage ceilings, restrictions on land ownership and business ownership, inferior public health and education, and no voting rights for the first 100 years of the city’s development.<sup>62</sup> The nationalist government of the post-second World War II era compounded these effects through forced removals of black residents from areas near the urban centers and development of segregated and undercapitalized housing and social infrastructure.

Without romanticizing early Johannesburg, it is clear that as racism and segregation policies intensified, they strangled innovation, particularly in the social structures of the city. For example, a British parliamentary report into labor shortages in Johannesburg in 1904 conducted over fifty in-depth interviews with business, union, and education leaders. The report’s recommendations and the policies it led to were primarily around incentivizing black labor yet only two of the testimonies were from black participants. Similarly, at the end of the Second World War South Africa’s highly respected Prime Minister, Jan Smuts, turned down advice from his staff to engage the leaders of the black community and political movements in finding a lasting solution to resolve racial tensions and achieve equal rights. Ironically Smuts had built his international reputation on negotiating tensions between the ‘white races of Africa’ and advocating for a rights-based new world order. The nationalist government that ousted him campaigned on apartheid as a policy solution to a devastating long-term effect. The Group Areas Act of 1950 further limited rights of black residents and forcibly removed whole communities to the margins of the city. In one example over 60,000 people were moved at gunpoint overnight. The city made extremely limited social housing investments in the 1960s and 1970s for black residents, and these were often men-only dormitories, with property rights limited to leases.

Johannesburg began to ease the implementation of these policies in the early 1980s, culminating in national democratic elections in 1994. When the first democratically elected government took control in 1994, it inherited not only the challenge of underinvestment in the black communities but the overall downturn of the city, slower economic growth, capital flight, and urban sprawl accelerated by ‘white’ flight. A wave of urbanization of over one million people in less than ten years caused an influx that sprouted informal settlements around the city.

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<sup>62</sup> Harrison, P. and T. Zack (2012). The power of mining: the fall of gold and rise of Johannesburg. *Journal of Contemporary African Studies*, 30(4), 551–570.



Colonial and apartheid land use and subsequent underinvestment in well-located housing mean poverty is concentrated in densely populated areas spatially, or socially, removed from employment. Low wages and poor education contribute, but the location and undersupply of housing are the defining features of poverty in Johannesburg as they replicate the current economic environment.

The apartheid-planned black townships of Soweto and Ivory Park appear on the far Eastern and Western edges. The previously middle-class high-rise apartment districts near the inner city are now mostly poor and have become one of the most densely populated urban areas in the world. Having survived forced removals, one neighborhood—Alexandra—appears in the economic zone but is separated by a freeway and light industry from Sandton, Africa’s wealthiest square mile. The residents of these areas spend 20% of their income on transport and 46 minutes per trip.<sup>63</sup>

This concentration of poverty is a drag on individual upward mobility and regional growth. Poor access to social systems, markets, and institutions are both the cause and consequence of poverty, and the resultant inequality has severe social (disease, crime, civil unrest) and economic (constrained growth) consequences.<sup>64</sup> In Hillbrow density has soared to over 67,000 people per square kilometer, which is five times higher than the poorest neighborhoods of New York City. This density puts huge pressure on local government services and negates the positive social effects of living closer to economic opportunity. The overpopulated and poorly maintained and managed environment means residents do not feel at home there; only a significant improvement in the management of the area will realize the opportunities that are present.<sup>65</sup>

This reality shows the importance of context in understanding economic data. Poor planning and historical legacy often negated agglomeration benefits. The city estimates that doubling employment density would improve productivity by up to five percent.<sup>66</sup>

The transition of governance created a period between 1990 and 2000 with limited local public spending, and a retraction of management. As South Africa opened to global markets the city experienced rapid population growth and neoliberal economic forces drove growth and private development thus creating splintered urbanism (gated communities and malls), urban sprawl, and a transition to a service economy that exacerbated inequality.

Even in this environment Cartwright and Marangane<sup>67</sup> document the city of Johannesburg’s remarkable turnaround from bankruptcy in 1998. This turnaround arguably did little for the city’s poor as inequality accelerated but they recognize a rapid rise to international standing, culminating symbolically with the hosting of the 2010 FIFA World

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<sup>63</sup> Kelly, T. (2014). Tech hubs across Africa: Which will be the legacy-makers? | Information and Communications for Development. Available at: <http://blogs.worldbank.org/ic4d/tech-hubs-across-africa-which-will-be-legacy-makers> [access: 14.03.2017].

<sup>64</sup> Galster, G. and S. Killen (1995). The geography of metropolitan opportunity: A reconnaissance and conceptual framework. *Housing Policy Debate* 6, 7–43.

<sup>65</sup> Silverman, M. and T. Zack (2007). *Land Management and Democratic Governance Issues in Hillbrow/Berea, an Inner City Area of Johannesburg*, Commissioned by Planact and CUBES, Ford Foundation Project.

<sup>66</sup> City of Johannesburg (2016). *Spatial Development Framework 2040 City of Johannesburg Metropolitan Municipality*, City of Johannesburg, Department of Development Planning. Retrieved from <http://www.joburg.org.za> [access 28.03.2017].

<sup>67</sup> Cartwright, A. and N. Marangane (2016). *Urban Governance and Turning African Cities Around : City of Johannesburg*. Nairobi, Kenya.

Cup Final in Soweto. High-speed rail, bus rapid transit, mega-scale freeway improvement projects, and private investments such as one of the world's largest malls have boosted the city's image and economy. Other high-profile events such as a failure in city billing systems (even though SAP rated the integration successful), massive construction collusion on World Cup projects, and a contested open road tolling system to pay for the upgrades have countered some of the improved perceptions. Business, adventure, and regional shopping tourism have become a primary source of income, and the economy has grown at a far higher rate than the country as a whole.

In 2016, like in many African cities, there existed two starkly different Johannesburg's, one of poverty and exclusion "from below" and another of global competitiveness and consumer excess "from above". Almost half of Johannesburg's population was not born in the city, and one in ten was not born in South Africa.<sup>68</sup>

### City Government Response

Under the leadership of Executive Mayor Parks Tau (2012–2016), Johannesburg city government for the first time began to exert a progressive influence on the urban economy that at least partly lived up to the rhetoric of South Africa's claimed developmental state. Tau focused on innovation in local government and created space for the experimentation, risk and the additional budget this required to reposition the city as a platform of competitiveness and urban renewal.<sup>69</sup>

The City of Johannesburg now supplements national healthcare, education, and social transfers with its clinics and a food security program, thus reducing income inequality and poverty levels over the past five years. These improvements are recognized primarily as the result of transfers, and the attention has shifted to policies that will drive equal growth.

In this context, the City of Johannesburg (CoJ) adopted the 2040 Growth and Development Strategy. The city aimed to transform the economy and improve competitiveness through industrial transformation, spatial rejuvenation, and institution and global identity building.<sup>70</sup>

In 2013 CoJ announced the largest local capital program in post-apartheid South Africa with plans to "re-stitch" the city and create "quality of life" for all. The latest statutory five-year Integrated Development Plan (2016-2021) includes these investments as well as the local economic development strategy. The Johannesburg Development Agency, responsible primarily for targeted property development, is tasked with implementing the Corridors of Freedom project.<sup>71</sup>

Corridors of Freedom is rooted in transit-orientated development theory, using public transport and infrastructure investments along existing transit routes between the densest

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<sup>68</sup> Palmary, I., B. Hamber and L. Nunez (2015). *Healing and Change in the City of Gold*. Retrieved from <http://link.springer.com/10.1007/978-3-319-08768-9> [access: 28.03.2017].

<sup>69</sup> Cartwright, A. and N. Marrengane (2016). *Urban Governance and Turning African Cities Around : City of Johannesburg*. Nairobi, Kenya.

<sup>70</sup> City of Johannesburg (2011). *Joburg 2040: Growth and Development Strategy "A promising future."* Retrieved from <http://www.joburg.org.za> [access 28.03.2017].

<sup>71</sup> JDA (2016). *Johannesburg Development Agency 2016/2017 Business Plan*. Retrieved from <https://www.jda.org.za> [access: 29.03.2017].

residential neighborhoods and the employment centers of the city. This strategy, while top down, is designed to direct the present trends using an ecosystem view of the city that is complementary to an innovation ecosystem approach. While densifying work, residential activity, and recreational activity along transport corridors the city will also provide broadband wireless internet access. Johannesburg has identified investment precincts with creative economy focuses such as the fashion district, the film district, the diamond district, and the digital innovation district. In partnership with local banks, the City of Johannesburg runs six small-to-medium-sized enterprise hubs that streamline services for small businesses, while the city's policies work to reduce the cost of doing business, the cost of data, the cost of transport and the cost of financial services.<sup>72</sup>

A further institutional response to the spatial challenges was the creation of the Gauteng City-Region Observatory (GCRO), a research partnership between the Gauteng Provincial Government and the Universities of the Witwatersrand and Johannesburg (UJ).<sup>73</sup> The GCRO improved the integrating capacity of local government by, for example, commissioning an interactive GIS system from the Johannesburg Centre for Software Engineering (JCSE), a partnership between Wits and the CoJ.<sup>74</sup>

The JCSE partnership was extended in 2016 to create the Tshimologong Digital Innovation District that used corporate tax rate credits to attract firms and encourage the growth of Johannesburg's software cluster in a district of the inner city that has been experiencing urban renewal. Early investors included an IBM research laboratory and the innovation offices of provincial government agencies such as Treasury (e-government services Design and Validation Services) and the Innovation Hub (South Africa's only accredited innovation center). The World Bank reported that Johannesburg hosted three digital technology hubs, including venture capital lead hubs in the Fintech environment.<sup>75</sup>

In 2016 the University of the Witwatersrand appointed Professor Ronald Wall as the Johannesburg City Chair of Economic Development. Professor Wall, also the head of Urban Competitiveness and Resilience at Erasmus University Rotterdam, mapped trade flows to determine Johannesburg's relative position in the increasingly connected network of global cities. This data was used to guide urban planning within changing economic demands.<sup>76</sup>

While the authors identified innovation as a relative strength with industry and university collaboration, they warned that declining patent filing rates and an under-investment in venture capital should be noted. The South African National Innovation System was conceptually sound but poorly integrated with the efforts of Johannesburg, the nation's economic engine.<sup>77</sup>

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<sup>72</sup> Adams, S. (2016). Joburg positioned as hub for entrepreneurs. *Destiny Magazine*. Retrieved from <http://www.destinyconnect.com/2017/03/14/joburg-positioned-hub-entrepreneurs/> [access: 30.03.2017].

<sup>73</sup> Mubiwa, B. and H. Annegarn (2013). Occasional Paper 4: Historical spatial change in the Gauteng City-Region. Retrieved from [http://www.gcro.ac.za/sites/default/files/reports/mubiwe\\_occasional\\_paper\\_new.pdf](http://www.gcro.ac.za/sites/default/files/reports/mubiwe_occasional_paper_new.pdf) [access: 29.03.2017].

<sup>74</sup> JCSE, JCSE Annual Report 2015/16. Retrieved from <https://www.jcse.org.za> [access: 29.03.2017].

<sup>75</sup> Kelly, T. (2014). Tech hubs across Africa: Which will be the legacy-makers? | Information and Communications for Development. Available at: <http://blogs.worldbank.org/ic4d/tech-hubs-across-africa-which-will-be-legacy-makers> [access: 14.03.2017].

<sup>76</sup> AfDB, OECD and UNDP (2016). *African Economic Outlook 2016: Sustainable Cities and Structural Transformation*, Available at: <http://www.oecd.org/countries/namibia/1826046.pdf>. [access 28.03.2017].

<sup>77</sup> Raphasha, P.I. (2015). Integrating National and Regional Innovation Policy : The Case of Gauteng in South Africa. University of the Witwatersrand.

Recent judgments of the Constitutional Court in city matters, including local street vendors and zoning approvals, have caught the attention of researchers. Researchers were studying the perspective of judges on cities in South Africa, India, and Colombia. Judgments affect the right to the city, and we encourage similar work on judgments that impact local innovation systems.<sup>78</sup>

Each of these actions has combined to create an ecosystem with dispersed governance and increasing interconnectivity toward an innovation ecosystem in Johannesburg. With its financial strength, commercial activities, and intellectual resources, the City of Johannesburg has great potential to emerge as a strong innovation ecosystem. It has sufficient local institutions that can serve as centers for the absorption of internationally available technologies. To move in this direction Johannesburg will need to review the available technologies and make the necessary adjustments in its institutions to foster technological catch-up and to leapfrog.

## **5. Lessons for emerging megacities**

Emerging megacities in developing countries have a chance to become innovation ecosystems. Galloping urbanization and negative externalities and pathologies—including overpopulation, urban poverty, poor living condition, congestion, pollution, social exclusion, and ethnic conflicts, among others—do not negate the opportunity. Thus the urban potential is to reposition cities toward innovation ecosystems. To reposition, a city needs to be governed in an innovative way to spur and enhance the creation of an innovation ecosystem. Transforming urban areas of developing countries into well-managed, modern, and innovative areas require activities and actions in all identified dimensions of a megacity innovation ecosystem, including entrepreneurship, education, environment, culture and connectivity, and by all cities participants through symbiotic and value-creating interactions.

Authorities play a crucial role in a megacity in terms of how they coordinate the dimensions and how they manage and govern it.

Successful public-private partnerships (PPPs) have emerged in an array of areas. PPPs have been used to promote enterprise and entrepreneurship, support and build capabilities for innovation, launch funding initiatives to transmit ideas into practical solutions and take them to the market, support human development, and build transportation and infrastructure. Public authorities together with entrepreneurs can further spur the emergence of innovative districts across given urban agglomeration and technological and industrial clusters as well as enhance the clustering of cities neighbourhoods in an innovative way.

Whether innovation takes the form of a product or process, or is organizational or social,—it can be applied in the analysis of a megacity and utilized in the city context. Thus, by analyzing the potential use of innovations at the megacity level, we can identify various dimensions of their use, which can include people (including individuals, the level of a household and enterprise); infrastructure (transportation, housing, management and distribution of energy, energy use of electricity, heating, renewable resources); environment (pollution, climate, haze); communication (ICT, early warning systems, cities management, among others); and urban planning.

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<sup>78</sup> Coggin, T. (2017). Urban Law Lab. Retrieved from <https://www.urbanlawlab.org/> [access: 2.04.2017].

The role of the government would include elaborating on spatial planning, legislation procedures and policies for a progressive legal framework where entrepreneurs can freely develop and innovation usher in.

Another important aspect is governments support for education. In that respect, all level of education is crucial, but from innovation and megacities point of view secondary and tertiary education seems decisive. Further collaboration between government, the private sector, and academia—thus enhancing Triple Helix—is necessary to spur innovation ecosystems through common research, funding, grants, and other initiatives designating and targeting crucial areas for sustainable development of a city.

The activities undertaken—whether at the level of the city authorities, or in collaboration with private sector and academia while leading to creating a megacity as an innovation ecosystem—will naturally attract talents and creative people into that system. Additional initiatives could be undertaken in that respect, whether through city-branding, promotion, joint university programmes, internships, joint corporation internships, conferences and summits, sports, and culture events, among other incentives.

One of the most important aspects attracting creative people into a city is its cultural potential. The authorities of the city have a particularly important role in that respect, as culture very often requires public funding and assistance.

The environment is another crucial aspect in the sustainable development of a megacity and quality of life for its inhabitants. This area seems especially problematic for fast emerging megacities, facing problems of pollution and congestion. Environmentally targeted activities can be undertaken at the governmental city level, but they can also be encouraged through sustainable entrepreneurship, civil society, and individual citizens themselves.

Finally, regarding connectivity, there are two critical dimensions. The first is connectivity within a megacity itself and the second connectivity with the world economy at large. Both dimensions are crucial and interconnected. One aspect to be mentioned here is the importance of public-private partnerships in transportation building and planning, including public transportation, roads, harbours, and airports, as important gateways in today modern and globalised world economy.

Another significant aspect of megacity connectivity is its connection with the global economy whether through industries and corporations (i.e., services, global value chains), international institutions and organisations, and other forms of networking and cooperation (collaborative initiatives, forums, platforms). The later dimension of connectivity underlines the importance of external actors in repositioning a megacity into an innovation ecosystem, and here we consider support of research and academic institutions from abroad; assistance of knowledge and expertise of diaspora and experiences and learning lessons from other states, cities, megacities, and smart cities.

Above all, clear and long-term vision and strategy of megacity authorities are necessary, followed by practical solutions and sustainability of projects and strategies. Thus, problems resulting from the vast population in megacities can be alleviated with good governance and by governing cities as innovation ecosystems resulting in significant improvements in numerous areas of megacity structure and functioning of its inhabitants.



Growing urbanization with rising urban agglomerations of megacities can also drive growth and creativity at the national level, contributing to country's GDP. Central governments should acknowledge the impact of megacities on national economy as well as on megacities participants and encourage their governance in an innovative manner as innovation ecosystems. What is more, as the Lagos and Johannesburg case studies show, a megacity can play a significant role in the developing world to promote development and address related problems. From that standpoint, the clear division of competencies between the central government and authorities of a megacity is crucial, as is the empowerment of megacities for a wider range of competencies along with funding.

Addressing all megacity dimensions (including entrepreneurship, education, environment, culture, and connectivity) and creating value added from synergies between cities authorities, the public and private sectors, as well as academia with an active and collaborative involvement of all cities participants allow a city to be reposition into innovation ecosystem. It should be further supported and encouraged by central government and other external agents and institutions for better outcomes.

Shifting the focus of city management from regional administration to innovation involves experimentation and institutional reforms based on lessons learned. These lessons can hardly be sustained over time without corresponding reforms in the laws and regulations governing the functioning of cities. This is not just a matter for the cities but involves legislative coordination with federal authorities. The absence of such legal entrenchment could lead to tensions between established administrative approaches and the new objectives to focus on innovation. When such conflicts arise it is likely the incumbent institutional arrangements are likely to win the day because they are supported by existing laws. The only way to counter such resistance to change is to codify the lessons learned in law, which also means engaging other branches of government such as the legislature and the judiciary.

## **Conclusions**

A growing population in Africa with rapid urbanization followed by a rising number of both cities and megacities create a great challenge for the continent, but also a vast opportunity for its development. Urbanization along with a young generation of Africans and an emerging middle class can significantly contribute to the growth of GDP and result in the prosperity of societies. Urban agglomerations of megacities as areas concentrating people, talents, academic institutions, the private sector, technology parks, and innovation hubs can be perceived as promising ground for innovation and innovative ecosystems but also as innovative ecosystems themselves.

Furthermore, megacities will attract more talents and creative individuals, as well as innovative entrepreneurs if they provide an attractive environment, what include security, education possibilities, business climate, culture, air quality, transportation, and connectivity. In that sense, innovative governance of a city is necessary to retrieve it towards an innovation ecosystem, which participants will be able to evolve and adapt in a way, so the system will be self-accelerating its creativity and innovativeness moving to the new dimensions, as the desired direction of megacities development.

The case studies further show that developmental problems associated with overpopulation, urban poverty, city congestion, pollution or security can be substantially alleviated if not eliminated at the city level. This point further underpins that urban areas



consisting of both cities and megacities might be more efficient places than central governments to address development issues if properly governed. Thus, as Kaplan notes, big cities could be a basis for a new urban-based development model,<sup>79</sup> which should be considered by numerous developing countries in Africa and worldwide.

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<sup>79</sup> Kaplan, S. (2012). City Development States: Why Lagos Works Better than Nigeria. Global Dashboard. Retrieved from <http://www.globaldashboard.org/2012/05/10/city-development-states-why-lagos-works-better-than-nigeria/> [access: 22.03.2017].