

# COUNTRY OVERVIEW

## KENYA

An Introduction to the Country Economy  
and the National Innovation System



### AID 11346

## Emerging African Innovation Leaders

G7 Exchange & Empowerment Program  
for enabling Innovation  
within the Next Production Revolution

Work Package 1



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## COUNTRY OVERVIEW: KENYA

### An Introduction to the Country Economy and the National Innovation System

This report describes Kenya's National Innovation System (NIS) under the lens of the Next Production Revolution (NPR). After summarizing the main characteristics of the country's economy, it introduces the NIS players and institutions that are considered to sustain the diffusion of NPR technologies and business models across the main domestic industries. The report is primarily aimed at introducing all the members of the Emerging African Innovation Leaders project, including trainers and mentors, to the country's economy, its potential for the NPR technologies and the NIS components that can foster the embracement of the NPR in Kenya. The report content may also be of interest to local and international policymakers, enterprises and civil sector organizations that are working toward the NPR adoption in the country.

*The document was produced by Boris Mrkajic in the March-April 2018 as a postdoc researcher of Politecnico di Milano, School of Management. The report is part of a serie of six Country Overviews, which were designed and reviewed by the "Emerging African Innovation Leaders" research team composed by Emanuela Colombo, Paola Garrone, Andrea Gumina, Fabio Lamperti, Boris Mrkajic, Felipe Repetto, Nicolo' Stevanato and Stefano Pistolese from Politecnico di Milano, and Pierluigi Leone and Leonardo Rosciarelli from Politecnico di Torino.*

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## Executive Summary

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This report describes Kenya's National Innovation System (NIS) under the lens of the Next Production Revolution (NPR). After summarizing the main characteristics of the country's economy, it introduces the NIS players and institutions that are considered to sustain the diffusion of NPR technologies and business models across the main domestic industries. The report is primarily aimed at introducing all the members of the Emerging African Innovation Leaders project, including trainers and mentors, to the country's economy, its potential for the NPR technologies and the NIS components that can foster the embracement of the NPR in Kenya. The report content may also be of interest to local and international policymakers, enterprises and civil sector organizations that are working toward the NPR adoption in the country.

The first section of the report describes the country focusing on several important aspects such as geography, politics, economy and industry structure. The main goal of the opening section is to provide an insight of the local conditions and to critically designate the starting point for the spreading of the NPR. Kenya has emerged as a leader in the East and Central African region, with the largest GDP among the neighbouring countries. The country has potential for growth,

and its economy has progress by 5.8% annual rate in the recent years. The main drivers of the positive development have been a stable macroeconomic environment, increasing remittance inflows, a rejuvenation of tourism, and most notably, government-led ICT infrastructure development initiatives. The young Kenyan population is another major asset for the country's future, and the youth is gradually moving toward urban and more industrialised zones. Kenya is also able to take advantage of its strategic location and access to the Indian Ocean, by providing a logistics and economic hub to the other countries in the region. Nevertheless, according to the most recent statistics (2012), almost half of Kenyan population still lives in poverty and more rapid progress is an imperative. In turn, there is a positive emigration trend, with around 50.000 Kenyan leaving the country per year. This number speaks volumes about the prevailing social, economic, political and environmental difficulties the country is facing.

Kenyan economy is still factor-driven. Relatively cheap low-skilled labour and natural resources are the major sources of Kenyan industry, which implies low wages for works and slow advancement of the social welfare. Services represent the majority of the national GDP, while the value added of agriculture has increased recently, and today accounts for almost 35% of GDP.

The agricultural surge can be attributed to the increased volume but also to an increase in agricultural productivity, which is a promising development. On the other hand, manufacturing value added is as low as 10% of the GDP as of 2016 and it has decreased in the recent decade, showing no signs of recovery from the financial crisis in 2007-2008. High-tech and medium-tech outputs are virtually non-existent. Among the scarce manufacturing sectors that are vibrant, food and beverages and textiles are the largest one. Another substantial issue that hampers development of Kenyan economy is the size of the informal sector. Estimates suggest that the grey economy contributes around 34% to the total GDP, and that it accounts for up to 85% of employment. The inherently suboptimal productivity of these informal ventures and participation in the local value chain are (as well as their interaction with the formal enterprises) are troubling.

As far as the NPR, the most important aspect is the national infrastructure, which is currently underdeveloped and obstructs fluid business activity and hinders the value chain. Kenya has made significant progress over the last couple of decades in terms of ICT infrastructure, as this was a strategic choice of the government. However, electricity infrastructure and grid are still major issues and probably the toughest challenge in this respect. The development has almost exclusively relied on private

investments so far, which has been far from sufficient. Transportation and mobility are not progressing with the needed pace either. Apart from the construction of a railway connecting Mombasa and Nairobi, which was completed in 2017, only 4 other projects have been dealing with the transportation network in the recent decades. The void of public investments in key infrastructure is slowing down the potential progress. Another hinder on the NPR road for Kenya is the lack of adequate human capital and know-how. The relatively high governmental expenditures on education have resulted in improvements in elementary education attainment, yet vocation training and particularly higher education are still rare, inefficient and not close in content with the needs of the most promising industries. Thus, research and innovation are fairly underdeveloped. In particular, private sector is underinvesting in innovative activities. Interestingly, most of R&D is financed from abroad. Still the potential for knowledge absorption is promising as according to the World Bank businesses are able to adopt technology licensed from foreign companies, which points to the importance of diaspora and foreign investments for the Kenyan economy.

Section 2 of the report provides a synthetic description of the country's NIS, critically analysing

the major actors in the field, their actions and readiness towards the embracement of the NPR, and the existing linkages and interactions among them. The largest part of the formal economy concerns small, medium and micro-scale enterprises (MSMEs), which provide services or manufacture a items designed to meet the domestic needs of low-income households. The businesses have relatively low productivity levels. Most importantly, capital productivity in the manufacturing sector is particularly low, compared to the regional and global productivity levels (e.g. productivity is up to 3–4 times lower than that of comparable Indian firms). Majority of the manufacturers are using outdated technologies, running outdated systems and using obsolete machines. The government tries to foster the development via a wide policy programme called Kenya Vision 2030 for the Manufacturing Sector launched in 2008, under which the objectives are to strength the capacity and local content of domestically manufactured goods, increase the generation and use of R&D results, raise the share of products in the regional market from 7% to 15% and develop niche products for existing and new markets. These programmes are encouraging and ambitions, but a range of institutional voids make their implementation difficult. As far as the universities, they are still centralised and comprehensive,

laggard in providing the education programmes that match the labour market needs and underinvest in research. Vocational schools play an important role too, and there are more than 1000 in Kenya, yet it is not easy to assess their effectiveness. There are also a range of institutions that are directly supporting innovation and enterprises present Kenya. Nevertheless, their impact is typically overly ambitious, not very well designed, and cannot be easily scaled. The local institutions lack resources and knowledge, while the support of the international ones rarely goes beyond provision of financial resources, which are vital yet largely insufficient to produce the intended impact.

The final section of the report has two distinct goals: first, it sums up the major findings around the NIS, deeply exploring few key actors of the NIS, highlighting their degree of involvement, actions and potential to foster the spreading of the NPR in Kenya; second, it presents the line of thought and a preliminary version of a “canvas” created to sum up the major findings on the industry structure, the NPR-related potential and the specific learning needs of the country. Specifically, concerning the first part, the Ministry of Industry, Trade and Cooperatives has been selected as first key actor for its involvement in the economic and social development of the country through science and innovation and implementation of the Vision 2030 through multiple

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agencies and programmes. Then, University of Nairobi, Kenya Association of Manufacturers, iHUB innovation hub have been selected for their roles in various fields of action within the NIS. Then, related to the second and final part, after a critical assessment, four key sectors have been identified and crossanalysed with the three NPR-enabling transformation fields of Energy, Mobility and Digitalization as an inspiration for the programme participants. Few example of actions have been proposed, along with a pool of Italian investors operating at these intersections, leaving a full and comprehensive evaluation and the canvas formulation to the AIL project participants, following the “Canvas formulation protocol” (i.e. dedicated file).



# 1.

## Country overview

This first section of the report presents a synthetic yet comprehensive overview of the Kenya in terms of social, political, economic and infrastructural aspects. The aim is to provide the necessary information to support the definition and the analysis of the potential scenarios deriving from the diffusion of the Next Production Revolution (NPR).

Kenya is a key player in East Africa, and one of the most prominent ones in Africa at large. With close to 51 million (2018) inhabitants, it represents the 7<sup>th</sup> most populated African country. The population is young, as a median Kenyan is merely 20 years old (2018), and 40% of the population is between age 0-14, which represents a challenge but also a major opportunity for the country's future. Most of the population is still living in the rural areas (73.5%), yet the migration of people toward urban zones is picking up (4.15% annual rate increase based on the 2015-20 estimate). The capital city, Nairobi, has estimated 4 million inhabitants as of today, and only two other cities, Mombasa and Kisumu, have over one million inhabitants.

Kenya has the largest GDP in the Eastern and Central Africa, and it is *Figure 1. Political map of Kenya* has a fast growing economy with 5.8% annual growth in 2016, due to relatively stable macroeconomic environment, low oil prices, but also a revival of tourism, increasing remittance inflows, and

most importantly government-led infrastructure development initiatives. Kenya is also a major communications and logistics hub, with an important Indian Ocean port and strategic land borders with surrounding countries. Nevertheless, according to the latest statistics (2012), almost half of Kenyan population still lives in poverty, which result in a negative migration of around 50.000 people per year. This number is not as severe as some of the neighbouring countries (e.g. Solamnia, Tanzania), yet it does reveal there are still a lot of social, economic, political and environmental difficulties Kenyan are facing. Main emigration destinations are the United Kingdom and the United States.

Governmental organization of Kenya is a presidential representative democratic republic, putting the most of the power in the hands of the president. While government effectiveness and regulatory quality have been fairly solid, the countries political stability, corruption and weak rule of law still represent important hindering features of the institutional environment (according to the Worldwide Governance Indicators data). Nonetheless, the recent (2010) constitution reform marked essential changes in the country by introducing devolution, transforming political and economic governance, and by strengthening accountability and public service delivery at local levels.



Figure 1. Political map of Kenya

Kenya has a diverse, yet mostly warm and humid tropical climate on its Indian Ocean coastline, with the cooler climate in the savannah grasslands around Nairobi, and especially closer to Mount Kenya. Due to these conditions, Kenya is world-known for its coffee crops, which are accounting for the majority of the country exports. Additionally, the expansive wildlife reserves, national parks and appealing beaches at the Coastal region, Kenya is home to the modern safari and has several world heritage sites, which are driving tourist activities – another major component of country's GDP.

On social development side, Kenya managed to meet some Millennium Development Goals (MDGs) targets, including reduced child mortality, near universal primary school enrolment, and narrowed gender gaps in education, driven by increased investments in healthcare and education. In fact, 78% of adult Kenyans are literate as of 2015 (according to the U.S. Central Intelligence Agency), which is above sub-Saharan Africa level (69%), but still a long way to go from full literacy. This number is slightly higher for men, yet women are closing the gap rapidly (around 6% difference at the moment). Furthermore, Kenyans can now expect to live an average of 65.4 years, which is a 12 years surge when compared to the start of the 21<sup>st</sup> century.

As a regional leader, Kenya has close ties with its fellow Swahili-speaking

neighbours in the African Great Lakes region, Uganda and Tanzania, as the three nations work toward economic and social integration through common membership in the East African Community. Relations with Somalia have historically been tense, although there has been some military co-ordination against Islamist insurgents. On the larger scale, Kenya has good relations with the United Kingdom and represents one of the most pro-American nations in Africa.

Kenya's youthful and growing population, increasingly dynamic private sector, improved infrastructure, new constitution, and pivotal role in East Africa, give it the potential to be one of Africa's great success stories. Key challenges still remain, including quality of life (where according to the Human Development Index, the country score of 0.55 is well below world's average of 0.71), economic and social inequality, the skills gap between market requirements and the education curriculum, low productivity as well as problems related to the climate change.

### 1.1 Economy

The economy of Kenya is in an emerging stage. While the country has a challenging task to close the large gap with respect

**Average  
education  
78%**

of adult Kenyans are literate  
(as of 2015)

**Life  
expendancy  
65.4 years**

**Human  
Development  
Index  
0.55**

The country score  
is well below  
world's average of 0.71

## Population

**51 M**

It represents  
the **7th most populated**  
African country

## Average age

**20 years old**

**40%** of the population  
is **between age 0-14**

## Annual growth in 2016

**5.8%**

**Kenya has  
the largest GDP**  
in the Eastern  
and Central Africa,  
and it is has  
a **fast growing economy**

## GDP per capita

**3,156 US\$**

Equivalent to around  
**19.5%**  
of the world's average

to the developed countries, it is on a positive trend. The last recorded GDP (at purchasing power parity - PPP) per capita is 3,156 international dollars in 2016 (The World Bank), which is equivalent to around 19.5% of the world's average. Kenya also ranked 91<sup>th</sup>/137 in the latest Global Competitiveness Report issued annually by the World Economic Forum. Nevertheless, Kenya has the largest GDP in the Eastern and Central Africa that is growing by 5.8% per year (2016). Medium-term GDP growth is estimated to rebound to 6.1% in 2019. On the other hand, inflation is steadily falling down, currently fairing at around 6.3% (Kenya National Bureau of Statistics). Most importantly, it has been rather stable and the indicators seem to point to the sustainability of this trend.

As far as the unemployment, based on International Labour Organization (ILO) estimates, it is around 11% in 2017, while the same for youth (aged 15-24) is around 22% (2017). Both numbers are on decreasing trends, which is a positive sign. Nonetheless, Central Intelligence Agency of the U.S. has reported more striking facts – 40% unemployment rate. This number probably does not include in the estimate a large number of labour force employed in the informal sector. Interestingly, the differences between male and female unemployment rates are

not significant (within 1%).

Another important aspect of the economy is trade. The trade balance (difference between exports and imports) is currently negative, which is a relevant hampering aspect for the overall country's development (8.41 billion dollars of deficit in 2016, according to Statista data). Kenya shows important local voids in terms of the most of production tools and mechanisation, which are vital parts of production. It imports mostly machinery and transportation equipment, petroleum products, motor vehicles, iron and steel, resins and plastics. In that respect, Kenya depends on partners such as India (18%), China (13%), UAE (8.4%), and Japan (6%). United states (4.1%) and UK (3.4%) are other important sources of imports for Kenya, while Germany (2.7%), Italy (1.5%), France (1.5%) and Canada (0.5%). On the other hand, agricultural products are central to Kenya's export industry with tea, coffee, mate, spices and fresh cut flowers being the most important (26%). Other export items include horticulture, vegetables, tobacco, cement, iron and steel products, and petroleum products. High-tech net exports (as a percentage of total trade) are extremely low, and stand at 0.56 (Comtrade database, 2013), which ranks the country on 79<sup>th</sup> place out of 125 countries. On the contrary, Kenya does much better in terms of telecommunications,

computers, and information services exports, from which it derives 4.27% of total trade, which ranks it in the top 20 countries in the world in that respect (World Trade Organization, 2014).

Kenya main exports partners are Uganda (12%), UK (7.9%), Tanzania (7.7%), Netherlands (6.9%), and United States (6.3%). Germany, France, Canada, Italy and Japan account altogether for less than 5% of the Kenyan exports. In total, exports account for around

### *Kenya does much better in terms of telecommunications, computers, and information services exports*

15% of the GDP, and have been on an increasing trend, apart from the very recent years, when they have stagnated and slightly decreased (according to the data provided by the Trading Economics).

Kenya is a member of the East African Community (EAC) with a population of approximately 145 million. It is also a member of the Common Market for Eastern and Southern Africa (COMESA) with a population of approximately 400 million. Exports and imports within member countries in theory enjoy preferential tariff

rates. Nevertheless, Kenyan firms, particularly manufacturing ones, do face non-tariff barriers in both EAC and COMESA. Additionally, exports from Kenya entering the European Union are entitled to duty reductions and freedom from all quota restrictions (based on ACP/Cotonou Partnership Agreement). Trade preferences include duty-free entry of all industrial products as well as a wide range of agricultural products including beef, fish, dairy products, cereals, fresh and processed fruits, and vegetables. Kenya also qualifies for duty free access until 2025 to the U.S. market under the African Growth and Opportunity Act (with products like textiles, apparels, and handicrafts). However, there is still low degree of awareness, particularly among smaller firms, of the preferential trade agreements and how to access such opportunities. Additionally, it is complex to qualify to access AGOA markets, given the complexity in product qualification, product entry requirements and obtaining AGOA visas.

## **1.2 Industry structure**

Kenya is a factor-driven economy, as its main sectors still derive their competitive advantage mainly on endowments of (cheap and low skilled) labour and natural resources. In turn, this supports only relatively low wages, and keeps the economy locked within the lower bound.

## Unemployment

**11%**

In 2017 unemployment  
for youth  
(aged 15-24)  
was around **22%** (2017)

## Market competition

**18th/123**

Kenya scored  
**5.63 out of 7**  
as reported by the Wold  
Economic Forum

## Major manufacturing activities

**36%**

**food and beverages**

**9%**

**textiles**

**8%**

**printing and publishing**

## Kenyan labour force

**50%**

is employed in services

Surprisingly, Kenya ranks well in terms of market competition (18<sup>th</sup>/123 with the score of 5.63 out of 7, as reported by the Wold Economic Forum), as a result of efforts of the Competition Authority of Kenya (CAK). Unfortunately, these efforts have not resulted in substantial increase of social welfare yet.

As for the industry structure, services are a dominant contributor to the national GDP, while Manufacturing Value Added (MVA) is still relatively low. The share of MVA in GDP as of 2016 was only around 10% (The World Bank). There has been a major slump in the percentage since the financial crisis (2007-2008), when MVA was almost 15%, which is striking. The major manufacturing activities that contribute to the MVA are food and beverages (36%), textiles (9%), printing and publishing (8%). Interestingly, close to 85% of the manufacturing employees are active in the informal sector (1.4 million of them). High-tech and medium-high-tech outputs are relatively low, at only 0.11% of total manufactures output (UNIDO, 2015). As far as the trends, food and beverages are on the up rise (from 28% in 2005), while oil, coal and the extraction of the value from the natural resources are on a decline. A similar trend to the one of MVA can be observed for services, which contribution to GDP of Kenya has dropped from 55% in 2007 to 45% in 2016. On

the flip side, the value added of agriculture has increased in the same period, from 23% to 35% of GDP. The rise is not only due to the drop in the other value adding activities, but also due to the increased volume and an increase of agricultural productivity. In particular, agriculture value added per worker has surged by more than 20% (from 695 to 841 constant 2010 US\$) in the last decade. This is, in fact, reflected in the overall productivity, as GDP per person employed has grown by the same rate (20%).

Similar distribution can be observed in terms of employment. Majority of Kenyan labour is employed in services (almost 50%). Employees are flowing from agriculture to services, as the latter becomes more mechanized and currently employs only about 29% of the labour force. Manufacturing is stable at around 21% of total employment.

Informal sector is substantial and while it is not easy to quantify and capture in data, estimates suggest that the size of the grey economy in Kenya contributes around 34% to the total GDP, and that it accounts for up to 85% of employment. At least half of the manufacturing firms are informal (The World Bank). In total, over 60% of those working in the informal sector are the youth, aged between 18-35 years, 50% being women. These informal businesses are typically rather small and mostly



service- (in the urban areas) or agriculture- (in the rural areas) based. Interaction between the formal and informal enterprises is relatively low. Formal firms do not engage the informal sector into their supply chain.

### 1.3 Natural resources

Natural resources that are found in Kenya include limestone, soda ash, salt, gemstones, fluorspar, zinc, diatomite, oil, gas, gypsum, wildlife and hydropower. Total natural resources rents as a percentage of GDP are relatively low, and faired

*Total natural resources rents as a percentage of GDP are relatively low*

around 3.3 % in 2015, which is above the world average, but not as high as most of the African countries (e.g. average of sub-Saharan Africa is 8%). Kenya still needs to tap the potential of the natural resources by developing appropriate skills and technologies.

Kenya has had to import substantial amounts of crude oil and natural gas, but local oil reserves have been discovered in the North Western Kenya fairly recently. Studies are still being carried out to establish the economic feasibility. As far as the renewable energy, Kenya has a great potential for exploring different

resources according to the Energy Regulatory Commission. In fact, almost 80% of Kenya's electricity is generated from renewable / clean energy sources already. Kenya currently has large hydropower capacity of 743 MW installed, while small hydro potential is estimated at 3 GW (only about 1% has been exploited at the moment). Geothermal resources in Kenya have an estimated potential of up to 10 GW spread over 14 prospective sites. Most importantly, geothermal has numerous advantages over other sources of power: it is not affected by drought and climatic variability; has the highest availability (capacity factor) at over 95%; is green energy with no adverse effects on the environment; and is indigenous and readily available in Kenya, unlike most thermal energy that relies on imported fuel. This makes geothermal a very suitable source for base load electricity generation in the country. Furthermore, Kenya receives daily insolation of 46kWh/m<sup>2</sup>, which implies high solar energy power generation potential that is so far untapped. Biomass is another very important energy resource, and it mainly derives from charcoal, wood-fuel and agricultural waste. Most of the rural household (around 90%) rely exclusively on biomass. Last but not least, there are biogas reserves, but there is no consolidated data that makes it challenging to determine the country's overall potential in that respect.

## Africa Infrastructure Development Index

**11th/53**

Kenya has progressed from the **35th/53** place (7.89/100) in 2003 to the **11th** place (30.14/100 score) in 2018

## Investments in ICT infrastructure

**7 billion US\$**

**48 projects in total** out of which **47 financed** by the public sector

## Power generation

**206.38 kWh**

per capita; the country ranks **111th/119**.

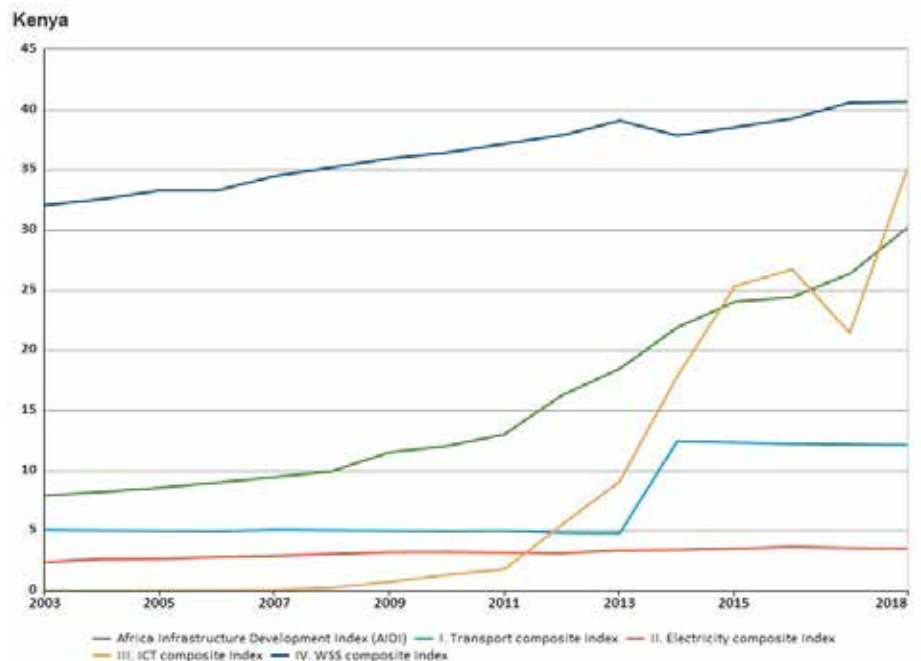


Figure 2 Africa Infrastructure Development Index (AIDI)

#### 1.4 Smart and integrated infrastructure

Kenyan infrastructure is underdeveloped and as such has been obstructing fluid business activity and hindering the value chain. Nevertheless, the country has made immense progress in the last two decades. To that end, Kenya has successfully attracted external investment for infrastructure development and has also raised capital in the global bond market (its first sovereign bond was offered in 2014). According to the Africa Infrastructure Development Index published by the African Development bank, Kenya has progressed from the 35<sup>th</sup>/53 place (7.89/100 score) to the 11<sup>th</sup> place (30.14/100 score) in

2018 (Figure 2, green line). The trend is promising yet it is mainly driven by advancements in the ICT infrastructure (yellow line). Investments in ICT infrastructure have reached almost 7 billion US\$ (48 projects in total, out of which 47 financed by the public sector), according to the Private Participation in Infrastructure (PPI) database.

Beyond ICT, development is still fairly stagnant. Electricity infrastructure and grid are still major issues and probably the biggest and toughest challenge to be addressed in this respect. There have been 20 projects focused on that field, with around 2.5 billion US\$ invested (red line). Almost all of these investments are financed

by the private sectors (2.4 billion US\$, 17 projects). Transportation and mobility are not progressing with the needed pace. The most prominent deal is the one the country of Nairobi has made with a Chinese company to construct a vital railway connecting Mombasa and Nairobi, which was completed in 2017. Apart from that, only 4 projects (according to PPI) have been dealing with the transportation network (railway, ports and airports) in

*Kenya has aggressively pursued connections, having nearly doubled electricity access of households in 4 years.*

the recent decades with less than 0.5 billion US\$ invested in total (blue line). These investments were exclusively provided by the private sectors. The void of public investments in key infrastructure is slowing down the potential progress.

Here below we break down the state of the three types of infrastructure that are the represent the highest potential for Next Production Revolution in Kenya.

#### **1.4.1 Energy**

Kenya does not perform well in terms of power generated, with 206.38 kWh per capita generated, the country ranks 111<sup>th</sup>/119, according to the International Energy Agency (IEA) World Energy Balances on-line data service (2015). Nevertheless, Kenya's per-capita power consumption is only 171 kWh (2014) compared to 126 kWh in Nigeria, which has a per-capita GDP nearly 3 times higher. In absolute terms, Kenya is still far away from having high access to electricity (accordingly to the Central Intelligence Agency of the U.S. only about 20% of the population has the access) and most rely on biomass as the key source of energy. In particular, Kenya's energy access and security ranks very low (bottom 10% of the world) according to the World Economic Forum Energy Architecture Performance Index (EAPI). Kenya is doing somewhat better in terms of the quality of electricity supply, yet still in the latter group, as it falls into the 96<sup>th</sup>/138 place.

Kenya has total installed capacity of 2.3 GW. Most of the capacity is derived from hydropower and geothermal energy sources (almost 80%) and fossil fuels (around 15-20%). Hydropower is, however, highly sensitive to rainfall and hence varies significantly in terms of the contribution to the generation mix. This fluctuation of hydropower is typically made up



by geothermal energy sources. The country's current effective installed (grid connected) electricity capacity is approximately 1.4 GW. Current electricity demand is 1,600 MW and is projected to grow to 2,600-3600 MW by 2020. Kenya has aggressively pursued connections, having nearly doubled electricity access of households in 4 years. As of end of June 2016, 55% of Kenyans were connected to the National grid, which is one of the highest connection rates in Sub-Saharan Africa (<http://www.export.gov/>). Installation costs (connection

### *There is a heavy dependency on wood fuel and other biomass*

to the national grid) as well as the cost of electricity service are relatively high and pose a major obstacle to the expansion of electricity connections to small businesses, which therefore rely on the decentralized alternative sources of energy. There is a heavy dependency on wood fuel and other biomass that account for 68% of the total energy consumption (petroleum 22%, electricity 9%, others account for 1%). The distribution is operated by Kenya Power (KP), which is currently the sole distribution company in

Kenya. KP has been working with the Rural Electrification Authority (REA), founded in 2006, on the acceleration of rural electrification. Their goal is to reach near-universal access by 2020 by adding 1 million new customers to the grid each year (also financed by the World Bank). The plan is to achieve this largely through the Last Mile Connectivity Program and through further subsidized connections for consumers in informal settlements. Furthermore, the goal is to build a stronger and more flexible grid by building in redundancies, reducing losses, and adding in smart technologies. Current transmission losses are 4.5%, while distribution losses are 13.5%. Another objective is to increase renewable off-grid access.

Lastly, Kenya is losing around 7% of sales due to electrical outages (The World Bank), which also ranks it among the worst performers in the world. This is hindering business activities, particularly the ones that rely on manufacturing and include production processes. Nevertheless, Kenya is fairing slightly better than the neighbouring countries and is making progress in this respect.

#### **1.4.2 Mobility**

Mobility and transportation are persistent problems in developing countries, and Kenya is no exception. Nonetheless, Kenya has invested highly in some types of infrastructure and managed

to make remarkable progress in making the mobility more efficient based on five decades of policies, initiatives and investments.

Road transport in Kenya constitutes a key component of Kenya's service sector and agriculture in both their contribution to the country's employment and income generation and their role in external trade, especially at the regional level. Hence, the Kenyan economy is strongly dependent on roads and road transport. Public road network of 160,886 km, of which 61,946 km is currently classified while 98,940 km are unclassified. Moreover, only 11,189 km is paved. During the 2000s, the government constructed the Nairobi—Thika Highway, the 50km road that is crucial in regional connectivity as it forms part of the Trans-Africa Highway running from Cape Town in South Africa to Cairo in Egypt. It links Nairobi to Ethiopia at the Moyale border town, nearly 800km from Nairobi.

Railroads as means of transportation have been marginalised in the recent decades. For instance, truck operators have dominated cargo ferrying from Mombasa to various inland destinations, with rail volumes dropping from about 70% in the 1970s and 80s, to 5% today. According to the latest available statistics (2006) provided by the World Bank, Kenya has less than 2 thousand kilometres of rail lines. Government has recently initiated the rail lines construction together

with the external investors (mainly from China), but the projects have been implemented slowly and with questionable cost efficiency. Once they will be completed though, they will enable decrease in transportation costs, not only within Kenya, but also by connecting landlocked countries with the port in Mombasa, which will be beneficial for the national economy (see *infra*).

Kenya has more than 40 airports, yet two major international hubs: Jomo Kenyatta International Airport (JKIA) in Nairobi and Moi in Mombasa, which take the most load in terms of international aircraft freight.

Mombasa is also an important port in East Africa and represents a logistics hub for Kenya and several other landlocked countries in the region (Uganda, Rwanda and South Sudan). Lamu port is another strategic hub. In particular, Lamu Port-South Sudan-Ethiopia-Transport project is a long planned venture that will, when completed, create a northern artery of the Kenyan and regional transportation. According to the Maritime Liner shipping connectivity index that captures how well a country is connected to global shipping networks, Kenya already ranks 76<sup>th</sup>/146 with 13.66/100 score. The ports, combined with a well-functioning railroad system, represent great potential for the country's economy. Overall, logistics is an on-going

## Public road network

**160,886 km**

**61,946 km** is currently classified while **98,940 km** are unclassified

## Rail lines

**2.000 Km**

(less than)

Railroads as means of transportation have been marginalised in the recent decades

## Logistics Performance Index (LPI)

**43rd/160**

## Compulsory education

**12 years**

from age 6 to age 17  
(UNESCO)

challenge even though Kenya is trying to cope with it. It ranks 43<sup>rd</sup>/160 countries on the Logistics Performance Index (LPI), a measure created by the World Bank to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance. In particular, Kenya is 40<sup>th</sup> in the ranking on logistics competence.

### 1.4.3 Digitalization

Likewise, other emerging markets, Kenya is unconstrained by the legacies of infrastructure, regulations and inertia in terms of digitalization. Its success with mobile money – two-thirds of its citizens use the technology – shows how technology can be put to work addressing local needs (e.g. the M-Pesa money transfer system, which also provides financing and microfinancing services). Customers, but most importantly, businesses can take advantage of this enabling technological shift. Most of the Kenyans believe ICTs can enable new business models, with the score of 5.07 (out of 7), ranking the country on 37<sup>th</sup>/123 place (World Economic Forum, 2017).

On the consumer's side, ICT access

is still fairly low (score 35.40 out of 100), which ranks Kenya on the 103<sup>rd</sup>/126 place, according to ITU (2017). The percentage of individuals using fixed broadband Internet is still fairly low (26% in 2016, as estimated by the ITU), with the average speed of around 5 Mbps (*fastmetrics*), which, nonetheless, puts Kenya on the very top in Africa. On the other hand, the percentage of individuals with mobile cellular subscription is rather high (more than 80%). More than one million of these subscribers (2-3% of the population) are using 4G technology that was introduced in December 2014, while the majority is still relying on 3G and 2G, due to the relatively low coverage (around 33% is covered by 4G) and old technology based (smart) phones. Access to the faster mobile Internet is rapidly growing due to lower costs of smartphones, as well as the service. E-commerce accounts for around 5% of total purchases in Kenya, which puts it in top 3 countries in Africa.

### 1.5 Human capital

Literacy rate in Kenya is still not at the absolute level. Only 78.73% of the adult population is literate. The number is higher for the youth (86.53%), which is the result of consistently high governmental expenditures on education of more than 5% of GDP, and currently 17% yet previously also up to 27% of total governmental expenditures

## Enrolment rate

**82%**

in primary education  
(2012)

**49%**

in secondary education  
(2009)

(UNESCO).

In Kenya, compulsory education lasts 12 years from age 6 to age 17 (UNESCO). However, school life expectancy is only 11 years (CIA), hence a narrow share of the population goes on in the education path over the compulsory period.

Net enrolment rate in primary education is around 82% (2012), secondary is around 49% (2009), while data on tertiary education rare, and estimates suggest relatively low rates (4-5%). Out

## *Kenya is lagging behind in the development of the entrepreneurship ecosystem*

of the university level graduates (based on year 2001 data, as no more recent data is available), 17.57% are engineers, 11.62% are natural sciences, mathematics and statistics, while the vast majority is in business, administration and law (UNESCO). While this statistic is relatively old, it points to the focus on less productive knowledge generation, and a shift toward STEM, and most importantly, engineering education is necessary. Kenyan firms do partly offset the lack of higher education. Namely,

according to the latest statistics of the World Bank (2013), more than 40% of firms offer some sort of formal training. That ranks the country to the 33<sup>rd</sup>/92 place worldwide.

### **1.6 Entrepreneurship**

As the other Sub-Saharan African countries, Kenya is lagging behind in the development of the entrepreneurship ecosystem. That fact is reflected by Kenya's low rank in 2018's Global Entrepreneurship Index (GEI): the country ranks 109<sup>th</sup>/137 with an index score of 18.4/100 measuring entrepreneurial attitudes, resources, and infrastructure. Similar can be observed in the World Bank's ranking on ease of starting the business, where Kenya ranks 117<sup>th</sup>/190 (and somewhat better for ease of doing business, where it ranks 80<sup>th</sup>/190, which benefits more larger firms).

According to Global Entrepreneurship Development Index (GEDI), Kenya scores low on entrepreneurial attitudes (risk acceptance, networking and cultural support) and start-up skills and human capital. Despite all this, Kenya ranks relatively high (49<sup>th</sup>/105 countries) in terms of new business density (new firm registrations per thousand population 15-64 years old), according to the World Bank (2014).

One of the reasons behind the relatively high entrepreneurship

### **Global Entrepreneurship Index (GEI)**

**109th/137**

the country has got an index score of **18.4/100**

### **New business density**

**49th/105**

Kenya ranks relatively high due to the relatively high availability of external funding

### **Global Innovation Index (WIPO)**

**80th/127**

The country has a relatively low score and ranking

### **Research**

**73rd/101**

**230 researchers**  
per million  
inhabitants (UNESCO)

rate could lie in the relatively high availability of external funding. Namely, Kenya ranks 29<sup>th</sup>/190 in getting credit (The World Bank), and it is one of the most developed in this category in Africa. The country is also the 9<sup>th</sup>/81 with 75.84 score in microfinance institutions' gross loan portfolio (World Economic Outlook Database, 2016). In reality, World Bank Enterprise survey (2013) show that 35.6% of firms received credit or loan, which equals world average. Additionally, percentage of loan requiring collateral (74%) and the value of collateral needed (188.4% of loan) are both lower than the world average. Only 4% of firms that ask for a loan are rejected, which is extremely low. Minority investors, who are one of the key funding providers in these countries, are fairly well protected by the regulations (ranked 62<sup>nd</sup>/190). In turn, there are also a number of Venture Capital firms active in Kenya (e.g. Fanisi Capital, Savannah fund Nest, DOB Equity), even though the lack of data hampers overview of the equity investment arena. The volume of Venture Capital deals is estimated at 0.05 per billion PPP\$ GDP, which puts Kenya on the 29<sup>th</sup>/92 place (Thomson Reuters, 2016).

### 1.7 Science, research and innovation

Kenya is performing fairly well in research and innovation, yet there is a lot of room to improve

both in terms of innovation inputs and outputs. The country has a relatively low score (31/100) and ranking (80<sup>th</sup>/127) in the Global Innovation Index published by WIPO, but it is in the top three countries in the Sub-Saharan Africa. The innovation efficiency ration (WIPO) is even higher (ranks 50<sup>th</sup>/127, with the score of 0.7/1), meaning that that the R&D investments are transformed fairly efficiently into the innovation outputs.

As far as expenditures on R&D

*R&D investments  
are transformed  
fairly  
efficiently into  
the innovation  
outputs.*

(GERD), Kenya at large invests around 0.8% of total GDP (UNESCO), fairing 45<sup>th</sup>/110 countries. Only 0.07% of GDP is spent on R&D by the Kenyan private sector (less than 10% of total R&D, rank 68<sup>th</sup>/90, UNESCO) and this is a weak point. Universities represent an important portion, yet there are only 230 researchers per million inhabitants (73<sup>rd</sup>/101, UNESCO). Interestingly, most of R&D is financed from abroad, around 47.14%, which ranks the country on the 6<sup>th</sup> place worldwide in that respect (UNESCO). Relatedly,

potential for knowledge absorption is promising as according to the World Bank businesses are able to adopt technology licensed from foreign companies (5.1/7 score, rank 36<sup>th</sup>/137). These facts emphasise importance of diaspora and foreign investments for the Kenyan economy.

Kenya is doing above average in Africa in terms of process innovation in particular. Namely, according to the limited sample of firms, around 27% of firms introduced process during the 2010-2012 period (Enterprise Survey 2013, Innovation Follow-up Survey in Kenya, The World Bank). The down side is (as in other developing countries) that micro and small firms, which constitute most of manufacturing firms, cannot afford to make use of the technologically advance equipment for production.

As far as other innovation outputs, patent families filled by residents in at least 2 offices rank Kenya as 91<sup>st</sup>/118 with around 0.03 patent applications per billion PPP\$ GDP (WIPO, 2013). Nonresidents have accounted for more applications, yet these numbers have been reversing recently (resident applicants are around double the number of non-resident applications in 2017). Importantly, the number of patents has been rising, from 20 in 2000 to 200 in 2016 (WIPO), as well as trademarks (from 436 in 2000 to 3870 in 2015, WIPO). Scientific and technical

publications are fairly numerous, with 11.58 journal articles per billion PPP\$ GDP (International Monetary Fund, World Economic Outlook Database, October, 2016), ranking Kenya on the 61<sup>st</sup>/126 countries and as a leader in the region. Similarly, the H index is 179, which is the economy's number of published articles (H) that have received at least H citations, ranking the country on the 52<sup>nd</sup>/127 position in the world (SCImago Journal & Country Rank, 2016).



# 2.

## Institutions of the national innovation system

This section describes the role major group of institutions plays in the national innovation system of Kenya, and how that is or potentially can translate into the Next Production Revolution (energy, logistics and digital innovations for the productive industry).

### 2.1 Firms

Kenyan industry is comprised of large, medium, small, micro, as well as Jua Kali enterprises (the informal sector). While larger firms are more productive than smaller enterprises, the largest part of the formal economy is formed by small, medium and micro-scale enterprises (MSMEs). These enterprises manufacture a wide range of items generally designed to meet the domestic needs of low-income households although some (yet only few) are exporting, and mainly so to the neighbouring countries. The structure of the manufacturing sector has undergone minimal changes despite shifts in policies, and the production is still largely geared toward consumer goods. Kenyan businesses have relatively low productivity levels on average (driven by the low productivity of SMEs and micro businesses). Most importantly, capital productivity in the manufacturing sector is particularly low, compared to regional and global productivity levels (e.g. productivity is up to 3–4 times lower than that

of comparable Indian firms). Majority of manufacturers are using out-dated technologies, running out-dated systems and using obsolete machines. This has been induced by declining capital investment levels from 30% of GDP in the 1980s to below 15% in the late 1990s. Over the past 15 years, gross investment in plants and equipment as a proportion of replacement value has been less than 5% for a vast majority of the manufacturers (70%). The low investments are caused by high levels of uncertainty in the

*Majority of manufacturers are using out-dated technologies, running out-dated systems and using obsolete machines*

business climate, diminished expected returns on investment due to high costs, and lack of long-term financing. Relatedly, research and development (R&D) investments by manufacturing firms are extremely low. In addition, most local small firms do not have technological competencies to acquire and apply knowledge from foreign firms. Although Kenya's labour productivity is comparable to

that of India and China, there is significant room for improvement, particularly among SMEs. In addition, Kenya's inefficiencies in the local transport and logistics sector (e.g. port, rail and road transport services) greatly hamper the ability of local manufacturers to access and be competitive in regional and global markets.

The results of the enterprise survey conducted in Kenya in 2015 showed that product innovation was manifest in small establishments engaged in manufacturing (31.6% of firms) and ICT activities (33.3%). However, as expected, survey results show that process innovation was largely absent in MSMEs.

Despite that, a few companies are showing that the advance tech-based innovation is indeed possible in Kenya. For example, BRCK (communications hardware) and KioKit (fully integrated education platform) have domestically developed successful technology solutions, proving that there is potential for the country to become a relevant player in technology manufacturing in Africa. A few constraints make this transition still difficult. First, finding highly skilled labour is still an issue due to the underperforming education and brain drain. Second, as previously mentioned, the local value chain is not properly developed that makes inputs and complementary

assets critical for technology companies not easily available (or not available at all), in turn forcing them to rely on expensive imports (and sometimes even pay high duty fee). Third, unreliable power supply negatively influences not only the production flows but also the life-time of the machinery.

There has been minimal cooperation by firms in developing both product and process innovations collaboratively. Nevertheless, there are a few associations that connect the firms, try to harmonize the business environment and lobby for the beneficial policies. Most prominent one is the Kenyan National Chamber of Commerce & Industry (KNCCI), which is a not-for-profit private company that focuses on networking (trade, international collaborations, internal logistics and market transactions), investments, policy, and direct support to companies in terms of training. A number of regional chambers exist too. In addition, a large number of firm associations exist, in virtually every sector (banking, insurance, manufacturing, constructions, tourism, etc.) The most relevant one could be the Kenyan Association of Manufacturers (KAM), established in 1959, active mainly in Nairobi. KAM provides direct technical assistance, capacity building programs, networking and mentorship, industry insights & analysis, trade



& export development services, etc. Furthermore, Kenyan private sector alliance (KEPSA) also works on advocacy and improvement of the business environment (and has more than 100.000 members). It is noteworthy to be aware of the KPMG's list of top 100 MSMEs (2017), recognising the most successful firms in the country.

## 2.2 Government

Two wide policy programmes and strategies are developed by the Kenyan government to develop local manufacturing.

The most important one is Kenya Vision 2030 for Manufacturing Sector, launched in 2008, under which the following objectives are pursued: (i) strengthening the capacity and local content of domestically manufactured goods, (ii) increasing the generation and use of R&D results, (iii) raising the share of products in the regional market from 7% to 15%, (iv) developing niche products for existing and new markets. To achieve these objectives, a set of key target areas have been identified and specific goals and targets have been set to steer industrial growth. These include: (i) development of the iron and steel industry through establishment of an integrated steel mill, (ii) development of SME parks, industrial and technology parks and industrial manufacturing clusters, (iii) upgrading of products produced by local SMEs, (iv) skills development for technical human

resources for the manufacturing sector, (v) commercialisation of R&D results and (vi) attraction of strategic investors for strategic sectors.

The second key government document is Kenya Industrial Transformation Programme (KITP), launched in 2015 and guided by Vision 2030. KITP identifies the need to overcome six challenges: infrastructure and land availability, skills and capabilities in priority sectors,

*Two wide policy programmes and strategies are developed by the Kenyan government to develop local manufacturing*

quality of inputs, cost of operation, access to markets and investor-friendly policies. Hence, KITP is supposed to (i) launch sector-specific flagship projects in key sectors (agro-processing, textiles, leather, construction services and materials, oil and gas and mining services and IT-related sectors) that build on Kenya's comparative advantages, (ii) develop Kenyan SMEs by supporting rising stars and building capabilities with model factories, (iii) enable environment to accelerate

industrial development through industrial parks/zones along infrastructure corridors, technical skills, supporting infrastructure and ease of doing business, and (iv) create an industrial development fund.

These programmes are encouraging and ambitious, but a number of features make their implementation far from straightforward. First, there is a lack of an industrial fund that SMEs can afford to access. Second, there is a lack of capacity-building and related programmes to build the necessary knowledge of the local firms (delay in setting up training centres). Third, there is a lack of knowledge of the market (demand and supply). Fourth, there are too many policies and strategies non-coherent simultaneously (KITP is dominating the others at the moment). Fifth, the informal sector, which is substantial, is typically not addressed by the programmes. And sixth, policy monitoring and evaluation are not put in place (for instance, calling for the inclusion of universities).

Additionally, there are other practical problems too. For example, although public procurement has a 40% local content requirement under the Public Procurement and Disposal Act, this is often not adhered to. The main reason cited for the discrepancy is the failure of local products to meet the quality standards. This is a valid issue and reinforces the need for the strong and aggressive industrial policy

and support of the manufacturing sector.

Last but not least, governance in general is an issue and creates problems for market transaction and fluent value chain. High levels of corruption are present and predominant criteria for providing state incentives is still rather politically based. In fact, companies report that bribes and irregular payments are highly common in the process of awarding public contracts (GCR 2015-2016). Tendering fraud is the fastest growing economic crime in Kenya: one in every three companies reports experiencing fraud in procurement during the past two years (PwC 2016). Moreover, rule of law is underdeveloped and makes market transaction and collaborations difficult, creating hurdles for the local and global supply chain.

A number of other sub-policies are actively pursued. Kenyan Investment Policy (KIP) is fairly new (2017), and sets a general objective to increase private investment to 24% of GDP by 2030. It is still very abstract and general, does not offer clear steps and actions, but rather sets up a framework.

Similarly, Kenya has only recently (2017) put up the National Trade Policy (NTP), which should promote efficiency in the growth of domestic trade through transformational measures that address the constraints impeding the development of the wholesale,

retail and informal sectors, within and across the borders. NTP enlists a number of actions and strategies, including Buy Kenya Build Kenya strategy, Kenya's Trade and Investment Missions definition, and National Export Development and Promotion Strategy for Kenya 2017-2022.

Innovation policy (and related funds) is centralized and there is high competition in R&D instead of cooperation, which makes R&D repetitive and keeps knowledge in isolated silos. Kenya has IP policies to promote creation, protection and commercialization of IP assets, to ensure equitable distribution of the commercial results of R&D, and to provide environment for dissemination of R&D products for the benefit of the society.

We provide a list of flagship projects within Vision 2030 targeting science and technology that are being implemented:

- Five industrial parks for SMEs in key urban centers, the majority in agro-processing.
- The Nairobi Industrial and Technology Park within a joint venture with Jomo Kenyatta University of Agriculture and Technology.
- Konza Technology City in Nairobi (Box 19.4).
- The Rift Valley focused on geothermal energy, within a programme to increase energy generation to 23.000 MW that

is mobilizing private capital for the development of renewable energy.

- Africa's largest wind farm (construction started in 2014), within the Lake Turkana Wind Power Project.
- Establishment of technology incubation hubs in all 47 counties.

Government ministries, departments and agencies that play an important role in manufacturing in Kenya are as follows:

- The Ministry of Industry, Trade and Cooperatives (MITC) aims to create an enabling environment for a globally competitive and sustainable industrial, enterprise and cooperative sector through an appropriate policy, legal and regulatory framework. The ministry is currently strongly leading the industrialization agenda with a focus on textiles, leather and agroprocessing.
- A number of government bodies that are relevant:
- The Micro and Small Enterprise Authority (MSEA) has a mandate to promote the development of competitive and sustainable micro and small enterprises (MSEs). It aims to spark industrial revolution by undertaking policy reforms and implementing targeted programs and activities in the MSE sector.
- Kenya Industrial Estates Limited (KIE) seeks to

facilitate the development and incubation of micro, small and medium-sized enterprises (MSMEs) countrywide by establishing industrial parks, providing credit and business development services in a sustainable manner.

- The Kenya Institute of Curriculum Development (KICD)'s core function is to conduct research and develop curricula for all levels of education below university.
- KenInvest is responsible for facilitating the implementation of new investment projects, providing after care services for existing investments and organizing investment promotion activities both locally and internationally.
- Industrial Development Bank Capital (IDBC) has a mandate to provide medium- and long-term finance and accompanying financial and corporate advisory services to medium- and large-scale industrial enterprises; it also provides working capital, machinery and finance.
- Kenya Industrial Property Institute (KIPI) has a mandate to administer industrial property rights, provide technological information and training in industrial property rights and promote inventiveness and innovation.
- Kenya Industrial Research and Development Institute

(KIRDI) conducts research and development (R&D) in all industrial and allied technologies, including mechanical, civil, electronics, chemical engineering, energy, environment and commodity technologies.

- Kenya National Trading Corporation (KNTC) is wholly owned by the government through MITC. It has specific objectives, the most important of which is promoting and growing wholesale and retail trade through its distribution network. KNTC can be leveraged to distribute manufactured products.
- Kenya Institute for Public Policy Research and Analysis (KIPPRA) conducts research and analysis on public policy issues with the goal of providing advice to policy-makers. It has a Productive Sector Division under which manufacturing falls.
- A large number of government energy bodies are responsible for the development, provision, supply and transmission of electricity to the manufacturing sector.

### 2.3 Universities

There are 48 universities in Kenya, out of which 22 are public, 9 are public university constituent colleges and 17 are chartered private universities. According

## Universities 48

22 are public,  
9 are public university  
constituent colleges  
and 17 are chartered  
private universities.

to the worldwide rankings (QS Ranking, 2016), the average score of top 3 universities is 4.3/100. Nevertheless, the oldest public university, University of Nairobi (UoN), which was founded in 1970, is ranked 7<sup>th</sup> in Africa. UoN is not the largest one in terms of the number of admitted students though. Instead, it is Kenyatta University, which currently has more than 70,000 students (21% of all university students in Kenya). Among multitude of issues universities in Kenya still need

### *Only 6 universities have introduced entrepreneurship courses in their curricula*

to resolve, including inadequate capacity, gender imbalances, rigid admissions criteria and limited opportunities for credit transfer, the most concerning matter is a mismatch between skills acquired and the demands of industry.

Majority of the large universities are comprehensive, offering a wide range of education subjects. The engineering or technology-based universities are still not of sufficient quality or scale.

Engineers Board of Kenya (EBK) and the Commission for University Education (CUE) are two governmental institutions that are in charge to develop engineering

education curricula in the country. Entrepreneurship education is still in its infancy. According to the recent 2010 study only 6 universities have introduced entrepreneurship courses in their curricula (Kabongo and Okpara, 2010). These have typically been ineffective, both in terms of the content as well as the methodology used. Full entrepreneurship tracks are even more rare. More concrete steps have been done by the University of Nairobi, Kenyatta University and Jomo Kenyatta University of Agriculture and Technology, which have innovation hubs, business incubators and science and technology parks. These can help both in terms of education and commercialization of the knowledge.

What is important to note is that the focus of the university faculty is mainly teaching, or even other activities that bring them income. Research is rarely conducted, as it costs money and brings no immediate returns.

Vocational schools play an important role too. In fact, the vocation training is steered by Technical and Vocational Education and Training (TVET) authority, established in 2013, that has been put in place to improve the skills of the Kenyan youth, and support them in both self-employment and entrepreneurship. There are almost 1000 vocational schools in the registry (five most relevant schools are listed here <https://softkenya>).

com/education/vocational-schools-in-kenya/). It is not easy to assess their effectiveness.

## 2.4 Innovation and enterprise support institutions

Institutions that are directly supporting innovation and enterprises are also present in Kenya. Nevertheless, their impact is typically overly ambitious, not very well designed, and cannot be easily scaled. The local institutions lack resources and knowledge, while the support of the international ones rarely goes beyond provision of financial resources, which are vital yet largely insufficient to produce the intended impact. Here below is a brief summary of these institutions.

There is a tangible presence of large intergovernmental agencies with different agendas and objectives. For example, World Bank Group and African Development Bank (AfDB) provide development-focused finance. United Nations agencies (UNDP, UNESCO and UNIDO) also have a noticeable presence and conduct multiple projects oriented to development of education, industry and quality of life in general in Kenya.

Government is setting up a lot of initiatives and (independent) agencies with the goal of supporting industrialization and innovation of private companies. For example, industrial parks are increasingly emerging and

have the goal to bring together multiple stakeholders like private businesses, financial institutions and governmental agencies, among others. Another governmental agency that has been in existence for a long time is Kenya Industrial Estates (KIE), which is a limited liability company intended to address indigenization of businesses, capital formation, regional dispersion of wealth, and exploitation of local resources. KIE provides industrial sheds, subsidized credit and improvement of entrepreneurial skills to indigenous owned

*Business activities  
in Kenya  
are centralized  
around clusters  
in big urban areas*

SMEs and micro businesses with special focus on rural industrial development. It has 37 branches across the country.

Furthermore, to have a complete picture of the local innovation environment and a better understanding which could be promising future initiatives and best practices that will eventually emerge within the NPR, it is useful to analyze the ecosystem of accelerators, incubators and capacity builders in Kenya. There is a plethora of initiatives ranging from private to government and



NGO supported ones, but vast majority of them are focused on ICT technologies (especially the private ones). They are mostly based in Nairobi (a few are diffused around the country), which is in line with the World Economic Forum data (2016) that show that business activities in Kenya are centralized around clusters in big urban areas (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field). In fact, Kenya is 38<sup>th</sup>/123 in the worldwide ranking. There are also overarching institutions that are trying to create communities of independent innovation hubs such as AfriLabs (<http://www.afrilabs.com/>), which is a network of incubators and support institutions that are oriented toward the development of new technologies in Africa. Four hubs from Kenya take part in this community.

## 2.5 Linkages between the institutions

Linkages between the four groups of actors of the Kenyan national innovation systems are generally weak, the system is fairly fragmented and needs to be enforced.

Unlike innovation systems in developed countries where the linkages between users and producers but also producers

and suppliers have been rather robust, the strength of these links in Kenya is fairly low. The reasons for these weak relationships are, as previously mentioned, underdeveloped logistics channels (for companies to reach the customers and vice versa), weak ICT infrastructure that does not allow communication and transparency between them to be nurtured, and modest collaboration between companies along the value chain but also in the same or related industries. These issues are particularly acute in rural areas of the country. Governmental initiatives to establish industrial parks and clusters are sluggish yet steps in a positive direction. In fact, the state of cluster development rank 38<sup>th</sup> in the world. To that end, inclusion of international firms in the clusters and incentives for the links with the local firms as their suppliers (global value chain inclusion) shall be a priority. Nevertheless, there is a knowledge gap that should be closed before the collocation benefits can be used.

There is a fairly positive link between universities and industry, mainly relying on research collaboration. The findings based on Kenya Innovation Survey (2012) indicate that universities are an important knowledge partner for firms to develop innovations, resulting in both improved product and production process (Kande, Kirira, and Ngondi,

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2017). This fact is confirmed by the Kenya's 25<sup>th</sup>/123 position worldwide (4.46/7 score), in terms of the degree of university – business collaborations (World Economic Forums' Executive Opinion Survey, 2016-2017). Five public universities have IP Policies implanted, while three of them even have Technology Transfer Offices (TTOs).

There are also a number of governmental research centers and initiatives to directly support the industry, yet their efficacy and impact are difficult to assess due to scarcity of reliable information. The positive note is government's openness to the inputs of independent think-tanks such as the Institute of Economic Affairs (IEA-Kenya) that provide them with impartial assessment of and advice for adjustments in terms of public policy.



# 3.

## Conclusions

Leveraging on the assessment carried out in Section 2, this concluding section presents a synthetic overview of the most active and relevant actors within the NIS of Kenya. Specifically, the actors have been analysed based on their actual commitment in the process of country innovation, and their potential role in fostering the diffusion of the NPR in the country. Merging the key highlights from the economic analysis in Section 1 with the critical considerations spurring from Section 2 and the first part of Section 3, a framework to synthesize opportunities and challenges deriving from the NPR, actual learning needs for the Emerging AIL project participants, as well as potential actions to be taken, has been formulated and presented to make sense of the analyses carried out all along the report.

### 3.1 Key actors in the national innovation system

Initially, a range of institutions has been identified to constitute the national innovation system of Kenya. Then, a number of key stakeholders were short-listed as the most active institutions as well as the institutions with the most potential for making the necessary change to move Kenya toward the Next Production Revolution (NPR). The objective was to identify at least one stakeholder per group of national innovation system actors (including firms, government, universities, support institutions). As criteria, the

following were used: (i) publicly communicated stakeholder's mission scope and objectives, (ii) available information on the stakeholder's activities and effectiveness, and (iii) interviews with experts familiar with the national innovation system of Kenya stemming from author's professional network. In particular, the reason for inclusion and main activities of each institution are elaborated below.

#### 3.1.1 The Ministry of Industry, Trade and Cooperatives (MITC)

MITC is a ministry dealing with the industrial organisation and policies in Kenya. It has a challenging responsibility prescribed by Vision 2030 to industrialise the country, grow the manufacturing sector and overall efficiency of the economy. There are a large number of agencies and sub-ministries that operate under MITC. Among many others, two institutions should be singled out: the Ministry of Industrialization and Enterprise Development (MOIED) and Kenya Industrial Property Institute (KIPI).

MOIED develops strategic, comprehensive and integrated programmes to guide Kenya on its journey to industrialization. Two of the key programmes are Kenya's Industrial Transformation Programme and the National Industrialization Policy. Both of them build on the Vision 2030 and try to create a robust, diversified and competitive manufacturing sector by boosting local production, expanding to

the regional market and taking advantage of global market niches. KIPi has a mandate to administer industrial property rights, provide technological information and training in industrial property rights and promote inventiveness and innovation. The scope of the institute to improve regulatory environment in order to spur innovation is critical for enabling both domestic and foreign investments that can lead to the intended goal of Vision 2030.

### **3.1.2 University of Nairobi (UoN)**

The University of Nairobi is a collegiate research university based in Nairobi. It is one of the largest universities in Kenya. Although its history as an educational institution dates back to 1956, it did not become an independent university until 1970, when it got independent from the University of East Africa. It is a highly reputable institution in Kenya that has the highest potential of all universities to be the engine of knowledge and skills development.

UoN had around 62,000 students in 2011, of whom 80% were undergraduates and 20% postgraduates. UoN is trying to cope with the rising demand for higher education in Kenya and it is constantly growing. Moreover, the university also offers a range of doctoral programmes, yet no numbers on the number of PhD students is available. UoN is also a top ranked university in Kenya, 7<sup>th</sup> in Africa and among top 1000 universities in the world.

UoN is a comprehensive university, offering a wide range of education subjects. Nevertheless, there is still relatively low number of STEM tracks offered. Apart from the low scale, quality of these programmes is to be improved as well. One of the causes of this lag is due to the fact that research is not the priority of the faculty, as there is a prevailing lack of resources, particularly so in engineering and technology fields. Furthermore, UoN's School of Business offers Entrepreneurship and Innovations Management and Master of Science track, which is

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in the world*

one of the very few programmes of that nature in the country and represents a pioneer initiative that can be instrumental for reaching the Kenya's Vision 2030. Integrating entrepreneurship and innovation courses in other university programmes is an imperative for the near future.

Another activity in which University of Nairobi is leading the way in Kenya is their innovation hub C4DLab (Computing for Development Laboratory), i.e. a university-based R&D and startup incubator, which is vital

in terms of commercialization of the knowledge, but also for sparking entrepreneurial intentions of the educated youth. C4DLab provides training and mentoring to a community of researchers, undertaking cutting-edge research. The focus is on ICT-enabled businesses regardless of the discipline that address real life problems.

UoN currently does not have a technology transfer office (TTO).

### **3.1.3 Kenya Association of Manufacturers (KAM)**

KAM is the representative organisation for manufacturing value-add industries in Kenya. It was established in 1959 as a private sector body, and it has evolved into a dynamic, vibrant, credible and respected business association that unites industrialists and offers a common voice for businesses. As such, KAM provides an essential link for co-operation, dialogue and understanding with the Government by representing the views and concerns of its members to the relevant authorities.

In pursuit of its core mandate of policy advocacy, KAM promotes trade and investment, upholds standards, encourages the formulation, enactment and administration of sound policies that facilitate a competitive business environment and reduce the cost of doing business.

In 2009, KAM unveiled a new corporate image as it observed 50 years since its establishment. More particularly, the following concrete strategic objectives are

set by KAM to be achieved by 2019: driving industrial growth and realization of 15% contribution of manufacturing sector to GDP, supporting skills-based job creation agenda and increase manufacturing sector jobs by 33%, and enhancing market access for products (locally and globally) to grow exports by 33%.

On top of the networking and lobbying function, the organisation is also committed toward a number of other support activities. First, KAM is driving the skills agenda for Kenya through providing young

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new corporate  
image as it  
observed 50  
years since its  
establishment*

graduates with opportunities for practical learning. This is done through the Technical Vocational and Education Training (TVET) Program of KAM. The 2-year pilot program intends to place over 500 graduates on internships and consequently jobs in industries, as well as provide refresher training to industry employees based on identified skills gap. Moreover, KAM runs the Manufacturing Academy, which aims at providing technical and/or specialised and management training and services that are aimed at

ensuring the Manufacturing industry continuously inspires global competitiveness. Second, KAM support SMEs too, by providing assistance in product development, access to markets, access to affordable finance, access to raw materials supply and management, access to technology, product innovation, and patenting. Third, KAM in conjunction with the Ministry Of Energy and Petroleum Development established the Centre for Energy Efficiency and Conservation (CEEC) in 2006, which runs energy efficiency and conservation programs designed to help companies identify energy wastage, determine saving potential and give recommendation on measures to be implemented.

#### **3.1.4 iHUB innovation hub**

Founded in 2010, iHub is one of the leading Africa support organizations that is deeply steeped in the local tech innovation culture. iHub has been one of the main catalysts for regional tech acceleration by providing support to more than 200 startups (30+ incubated). It is nowadays privately owned and profitable venture on its own.

iHub is focused on ICT-based tech entrepreneurs and individuals who aspire to create companies that tackle some of our biggest challenges in Kenya and beyond. The offering comprises co-working space, but also entrepreneurship support and innovation support. iHub also facilitates the possibility of venture funding through

connections with the local and international venture capital community. Over the years, iHub has been extremely active and has organized a large number of projects and initiatives (iHub Research, m:lab, Tajriba, etc.) and continues to do so (20+ events every month).

### **3.2 Challenges, opportunities and learning needs**

Kenya is one of the leading economies of East-Central Africa. Nonetheless, in order to continue its growing trend, it needs to increase efficiency of the economic system and follow its Vision 2030 to industrialise the country by implementing the next production revolution (NPR), and there are a number of elements of the NIS that are still to be enhanced.

From the governmental point of view, there is a need for more critical selection and design of mutually coherent policy programs that underpin Kenya's Vision 2030. At the moment, there are a myriad of programmes that overlap, which causes inefficient use of public resources. Moreover, these programs sometimes have even conflicting objectives. Relatedly, there is a need for more rigorous policy monitoring and evaluation. The inefficiency in implementation and inability of reaching the set targets in a reasonable period of time are common, and should be improved. As far as the innovation policy is concerned, the current centralise R&D funding provided by the government does not

*It needs to increase efficiency of the economic system and follow its Vision 2030 to industrialise the country by implementing the next production revolution*

*There is also a range of issues related to the enabling infrastructures and technologies that hamper a smoother emergence of the NPR*

spur collaboration, but rather competition between innovation agents. On top of that, selection criteria for these subsidies is not clear cut, making the process prone to manipulation and favouring of a very few privileged ones.

There is also a range of issues related to the enabling infrastructures and technologies that hamper a smoother emergence of the NPR. First, grid diffusion is relatively low and unable to reach most of the population, especially in the rural areas, which makes business activities, particularly productive ones based on physical machinery, extremely difficult. Second, resilience of the power network is low, making the availability of electricity uncertain and unstable. Expansion of a reliable network is an imperative. Then, even if the electricity is available, it is rather costly or even unaffordable for micro and small business that dominate the market. Electricity should be made more easily available in general. One of the reasons could lie in the centralised transmission and distribution, which seem to cause inefficiencies. Second, there is underutilisation of available renewable resources at the moment. More strategic public investments and attraction of (foreign) private investments using public-private partnerships could be speed up the development. Third, there is a need for further development of logistical infrastructure, which is currently not able to create smooth supply chain flows. In particular, railroads are necessary

to make the flow of goods around the countries more stable and most importantly, more cost effective. The existing investment projects are taking longer than expected and require additional resources, speaking in favour of the need for improved monitoring and evaluation.

As far as firms are concerned, there is a great need for formalisation of businesses. This would not only lead to more fund in the budget, but most importantly would allow the informal businesses to access credit market and value chain (both local but potentially also global), and systematically grow. Moreover, there is a need for providing incentives and support for SMEs to invest in new machinery, technology and R&D. This is currently an issue due to the absence of the technology and equipment in the country that thus needs to be imported, but comes with high import (duty) and transaction (searching, negotiating and contracting suppliers) costs. Subsidising, decreasing duty fees and negotiating deals with foreign providers on the country level could ease the barriers.

There is also a need for fostering linkages between local firms (particularly micro business and SMEs), but also between the increasingly present multinational corporations and local companies. That would allow the latter a channel to enter global value chains and potentially learn from the more developed foreign companies. Local firms should also improve their understanding of



the existing trade benefits, which allow them to be more competitive on large world markets that have more purchasing power. The export potential is currently untapped.

Education also needs to be improved to build the capacity for the NPR. There is a need for both advancements in vocation and higher education. The former is necessary to further improve technological absorptive capacity of local firms, which might not only be unable to innovate, but also not fully able to adopt and use the existing technology that might be available. The latter should develop STEM curricula and match teaching and research to the industry needs. That also includes further collaborations between the private sector and the universities that are currently rare.

As far as the opportunities for enabling and fostering the NPR in Kenya, there are a number of directions to follow. Renewable energy potential, particularly geothermal and solar, represent not only a chance to fulfil the increasing local demand for electricity, but also to be a high leverage for exports. The potential of developing logistics infrastructure is great, particularly if the Mombasa port gets better connected to the rest of Kenya and to the landlocked and other neighbouring countries in the region. This direction is in line with the potential benefits Kenya can draw from its superior position in the region, both in terms of

location (for international trade) but also in terms of technology and production efficiency, by building structurally easier flow of goods and services in the regional market.

Additionally, the most promising sectors are related to agriculture and its derivatives. The future potential lies in mechanisation of agriculture to increase productivity, and further development of food, beverages and horticulture industries (e.g. tea, coffee, mate, spices and fresh cut flowers) by integrating them

### *Education also needs to be improved to build the capacity for the NPR*

into the global value chain and boosting their exports regionally and globally. Table 1 presents examples of potential impact of the NPR on some of the relevant industries.

These challenges and opportunities require knowledge capacity that is currently missing in Kenya. Among other things, here is a list of learning needs that should be addressed in order to make progress toward the NPR:

- How to improve innovation and industrial policy design, implementation, management, monitoring and evaluation.
- How to design effective national policy for N.

- How to formalise businesses via entrepreneurship policy.
- How to identify emerging technological trajectories and how to leverage them by local businesses to improve business models and enable their inclusion into global value chains.
- How to attract additional innovation funding from alternative sources.
- How to efficiently channel and distribute innovation funding.
- How to leverage emerging infrastructures to facilitate networking, agreements and outsourcing linkages among SMEs, and between SMEs and (national and foreign) larger companies.
- How to design effective strategies for incentivising and enabling SMEs to fund development of new or usage of existing technologies and machinery.
- How to set up cooperative innovation projects between university and businesses.
- How to make the research at universities more commercially valuable and how to protect that IPR.
- How to use business incubators as a tool for fostering entrepreneurship for NPR.

Leading industries/ NPR-enabling transformations	Manufacture of textiles (ISIC codes 13)	Manufacture of food products (ISIC code 10)	Construction of buildings & civil engineering & specialized construction activities (ISIC codes 41, 42 & 43)	Manufacture of machinery and equipment n.e.c. & repair and installation of machinery and equipment (ISIC codes 28 & 33)
<b>Energy</b>	Continuity and security of energy supply allow firms to undertake operational improvement and increase productivity; Use of renewables and independent mini-grid helps to offset outages risk; Improved cost-efficiency result in higher international competitiveness; ...	Continuity and security of energy supply allow firms to undertake operational improvement and increase productivity; Energy efficiency allows for enhanced sustainability in agri-food production and agri-food lifecycle; Use of renewables and independent mini-grid can offset outages risk; ...	Expanded power grid coverage improves reliability and resilience of the construction works; Development of renewables makes the buildings more efficient (prioritise geothermal, hydro & solar); Energy stability allows firms for operational improvements and increased productivity; ...	Continuity and security of energy supply allow firms to undertake operational improvement and increase productivity; Use of renewables and independent mini-grid help to offset outages risk; Improved cost-efficiency result in higher international competitiveness; ...
<b>Mobility</b>	Prioritise linkages with established regional aviation hub (Addis Ababa) to enhance export opportunities; Improved road transportation allows for better organised and efficient supply chain; ...	Improved road transportation allows to better reach local demand and to take part into international supply chains, as well as improve the inefficiencies and wastes in agri-food chain; Prioritise linkages with established ports and regional airline hubs to enhance export opportunities; ...	Improvement of paved roads network for peripheral transport enhancement; Private-public investment & FDIs opportunities in national logistic system build-up; Railway system development improves efficiency along the value chain; ...	Improvement of paved roads network for peripheral transport enhancement; Prioritise linkages with established regional aviation hub (Addis Ababa) to enhance export opportunities; ...
<b>Digitalization</b>	Opportunities for operational improvements; New automation opportunities (e.g. packaging production stage); Enhanced logistic optimisation (e.g. goods & info flow management); Broadband connectivity for B2B marketplaces and platforms that facilitate more efficient supply chains (e.g. connecting local producers to international markets); ...	Opportunities coming from ICT for handling, storing, transforming (including food safety controls), packaging local agricultural produces; Broadband connectivity as a necessary condition for B2B marketplaces and platforms that disintermediate supply chains and foster access of local producers and transformers to international markets; ...	Private-public investment & FDIs opportunities in national digital system build-up with mutual synergies; New automation opportunities (e.g. high-tech firms); Opportunities for enhanced logistic optimisation (e.g. goods & info flow management); Improved technology absorptive capacity; ...	Improve broadband coverage to industrial & manufacturing areas; Improve speed; Opportunities for operational improvements (e.g. firms adopting updated machineries); Opportunities for new business models leveraging on digital platforms; Opportunities for enhanced logistic optimisation (e.g. goods & info flow management); Improved technology absorptive capacity; ...
<b>Examples of Italian firms / investors that could be interest in the sector</b>	n.a.	ACOS S.P.A., Rota Guido, SACE Group	Maltauro Group, Oikos	Finmeccanica Italy; Dasa S.R.L

Table 1. Examples of the NPR potential for some of the promising industries in Kenya.



## Appendix A

Table A1 presents an extended list of possible key actors and related contacts for Kenya. Actors have been selected according to their relevance within the NIS, according to an interviewed local expert.

Furthermore, each actor has been classified according to the specific type of institution and ownership (e.g. government, university, firm or supporting institution).

Actor and website	Contact(s)	Type of Institution & Ownership
Ministry of Industry, Trade and Cooperatives (MITC) <a href="http://www.industrialization.go.ke/">http://www.industrialization.go.ke/</a>	Telephone: +254 20-2731531 Email: ps@industrialization.go.ke, cs@industrialization.go.ke	Government
Ministry of Industrialization and Enterprise Development (MOIED) <a href="http://www.industrialization.go.ke/">http://www.industrialization.go.ke/</a>	Telephone: +254 20-2731531 Email: ps@industrialization.go.ke, cs@industrialization.go.ke	Government
Micro and Small Enterprise Authority (MSEA) <a href="http://www.industrialization.go.ke/">http://www.industrialization.go.ke/</a>	Telephone: +254 20-2731531 Email: ps@industrialization.go.ke, cs@industrialization.go.ke	Government
Kenya Industrial Estates Limited (KIE) <a href="http://www.kie.co.ke/index.php/about-kie/overview">http://www.kie.co.ke/index.php/about-kie/overview</a>	Telephone: 020-6651348/53 Mobile No: 0722297636, 0733279861 Email: admin@kie.co.ke	Government
Industrial Development Bank Capital (IDBC) <a href="http://www.idbkenya.com/">http://www.idbkenya.com/</a>	n.a.	Government
Kenya Industrial Property Institute (KIPI) <a href="http://www.kipi.go.ke/">http://www.kipi.go.ke/</a>	Telephone: +254-20-6002210/11 Mobile Phone: 0736-002020 Email: info@kipi.go.ke	Government
Kenya Institute for Public Policy Research and Analysis (KIPpra) <a href="http://kippra.or.ke/">http://kippra.or.ke/</a>	Telephone: +254 20 4936000 Email: admin@kippra.or.ke	Government
Kenya Institute of Curriculum Development (KICD) <a href="https://kicd.ac.ke/">https://kicd.ac.ke/</a>	Telephone: +254 020-210814/7	Government
KenInvest <a href="http://invest.go.ke/">http://invest.go.ke/</a>	Telephone: +254-730-104-200 Email: info@investmentkenya.com	Government
Kenya National Trading Corporation (KNTC) <a href="https://www.kntcl.com/">https://www.kntcl.com/</a>	Telephone: +254-0724651895 Email: info@kntcl.com	Government
Engineers Board of Kenya (EBK) <a href="http://ebk.or.ke/">http://ebk.or.ke/</a>	Telephone: +254-20-2719974 Email: registrar@ebk.or.ke	Government
Commission for University Education (CUE) <a href="http://www.cue.or.ke/">http://www.cue.or.ke/</a>	Telephone: 020-7205000 Email: info@cue.or.ke	Government
Kenya Industrial Research and Development Institute (KIRDI) <a href="https://www.kirdi.go.ke/">https://www.kirdi.go.ke/</a>	Telephone: +254-20-2388216/2393466 Email: dir@kirdi.go.ke	Government

Kenyan National Chamber of Commerce & Industry (KNCCI), <a href="http://kenyachamber.ke/">http://kenyachamber.ke/</a>	Telephone: +254 20 3927000, Email: <a href="mailto:info@kenyachamber.ke">info@kenyachamber.ke</a>	Supporting institution
Kenya association of manufacturers	Telephone: +254 (0) 722201368	Supporting
<a href="http://kam.co.ke/about-kam/management-team/">http://kam.co.ke/about-kam/management-team/</a>	Email: <a href="mailto:info@kam.co.ke">info@kam.co.ke</a>	institution
Kenya private sector alliance – KEPSA <a href="https://kepsa.or.ke/">https://kepsa.or.ke/</a>	Telephone: +254 202 730 371 Email: <a href="mailto:info@kepsa.or.ke">info@kepsa.or.ke</a>	Supporting institution
University of Nairobi Innovation Hub (C4DLab), <a href="http://c4dlab.ac.ke/">http://c4dlab.ac.ke/</a>	Telephone: +254 790 413 836 Email: <a href="mailto:hello@c4dlab.ac.ke">hello@c4dlab.ac.ke</a>	Supporting institution
Nairobi's Science and Technology Park <a href="http://www.jkuat.ac.ke/nairobi-industrial-park/">http://www.jkuat.ac.ke/nairobi-industrial-park/</a>	Telephone: 0675870001 Email: <a href="mailto:info@jkuat.ac.ke">info@jkuat.ac.ke</a>	Supporting institution
University Of Nairobi Science and Technology Park <a href="https://www.iasp.ws/our-members/directory/@415101/university-of-nairobi-science-and-technology-park">https://www.iasp.ws/our-members/directory/@415101/university-of-nairobi-science-and-technology-park</a>	Telephone: +254 0720750550 Email: <a href="mailto:stp@uonbi.ac.ke">stp@uonbi.ac.ke</a>	Supporting institution
Jomo Kenyatta University of Agriculture and Technology Cybercomb Innovation Hub <a href="http://www.cybercomb.com/">http://www.cybercomb.com/</a>	n.a.	Supporting institution
Technical and Vocational Education and Training (TVET) authority <a href="http://www.tvetauthority.go.ke/">http://www.tvetauthority.go.ke/</a>	Telephone: +254 20 2392140 E-mail: <a href="mailto:info@tvetauthority.go.ke">info@tvetauthority.go.ke</a>	Supporting institution
iHUB <a href="https://ihub.co.ke/">https://ihub.co.ke/</a>	Email: <a href="mailto:info@ihub.co.ke">info@ihub.co.ke</a>	Supporting institution
Aro FabLab <a href="https://www.fablabs.io/labs/arofablab">https://www.fablabs.io/labs/arofablab</a>	Telephone: +254720355951 Email: <a href="mailto:aro.fablab@gmail.com">aro.fablab@gmail.com</a>	Supporting institution
mLab East Africa <a href="https://webfoundation.org/projects/mlab-east-africa/">https://webfoundation.org/projects/mlab-east-africa/</a>	n.a.	
Nairobi Garage <a href="https://nairobigarage.com/">https://nairobigarage.com/</a>	Telephone: +254 755 556 955 Email: <a href="mailto:ngongroad@nairobigarage.com">ngongroad@nairobigarage.com</a>	Supporting institution
Growth Africa <a href="https://growthafrica.com/">https://growthafrica.com/</a>	Telephone: +254 (0) 724 151 924, +254 (0) 733 151 924 Email: <a href="mailto:info@growthafrica.com">info@growthafrica.com</a>	Supporting institution
@iLabAfrica, <a href="http://www.ilabafrika.ac.ke/">http://www.ilabafrika.ac.ke/</a>	Telephone: +254 703 034616 Email: <a href="mailto:ilabafrika@strathmore.edu">ilabafrika@strathmore.edu</a>	Supporting institution
NaiLab, <a href="https://nailab.co.ke/">https://nailab.co.ke/</a>	Telephone: +254-790-492467	Supporting institution
Konza Technology City in Nairobi, <a href="http://www.konzacity.go.ke/">http://www.konzacity.go.ke/</a>	Telephone: +254(0) 204343013/4 <a href="mailto:konza@konzacity.go.ke">konza@konzacity.go.ke</a>	Supporting institution
University of Nairobi (UoN), <a href="http://www.uonbi.ac.ke/">http://www.uonbi.ac.ke/</a>	Telephone: Tel: +254-20 3318262, +254-020 2429997	University
Kenyatta University, <a href="http://www.ku.ac.ke/">http://www.ku.ac.ke/</a>	Telephone: Tel: +254 20 870, ext 4000/3000 Email: <a href="mailto:dvc-rio@ku.ac.ke">dvc-rio@ku.ac.ke</a>	University

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