



**Kenya
Innovation
Outlook
Report**

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Preface

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Chair of the Board



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If we can't measure, we can't coherently improve!

The need to assess and measure the progress of a national innovation system (NIS) cannot be overstated. To effectively measure progress and impact of the NIS, we must have a sense of the baseline, a clear description of indicators and a reliable mechanism to harvest data at a reasonable frequency.

Increasingly, Kenya like many other countries has to search for new avenues of growth while improving living standards for citizens and visitors. Further, as a country, we must continuously explore means of creating sustainable employment opportunities and address the challenges that come with a growing population.

The Global Innovation Index (GII) measures innovation in a relatively holistic way by scoring and ranking over 140 countries. It contains input and output sub-indices as well as an innovation efficiency ratio which are used to generate an overall index. It's observed that many middle income countries fit between position 40 and 100. Kenya ranked position 88 in the GI ranking of 2022 and 3rd in Sub-Saharan Africa.

To move up the rank, experts recommend that countries have to enhance institutional reforms addressing key weaknesses in the political, regulatory and business environments. Investment in tertiary education, growth of research and development, improvement of market sophistication (access to credit, investment climate, trade and competition) and business sophistication (knowledge workers, innovation system linkages and absorption of knowledge) are some of the other areas that need to be tracked and strengthened.

KeNIA, is a young Agency with a huge mandate to develop and manage the National Innovation System. Tracking the progress within the system is paramount and the Agency commits to work with various partners to harvest data and present insights in a manner that easily triggers quantum transformation in the various relevant subsectors.

This report, prepared with limited resources, is not a perfect or comprehensive document, but a good foundation to build on. It should serve to provoke our thinking about areas of improvement, the need for reliable data collection and a demonstration that by demystifying innovation related issues we would see our individual roles within the NIS and what we could possibly do to improve it.

In this report, we deliberately introduce the national commercialization system and the start-up ecosystem. These two areas are of strategic priority for the Agency. It's crucial that we interrogate and demystify these two subsectors. Through these sub-sectors, we aim among other measurable indicators to build new innovative enterprises, grow the share of manufacturing in Kenya's GDP, scale the technology-driven and knowledge-driven industries in order to increase the exports and reverse unemployment rates.

In the year 2023, we aim to do a deep dive into efforts in counties, institutions, and the overall efficiency of converting innovation inputs to desired outputs.

Thank You



The Kenya National Innovation Agency (KeNIA) is a State Corporation established under the Science, Technology, and Innovation (STI) Act, No. 28 of 2013.

The core mandate of the Agency is to develop and manage the National Innovation System. The Agency is therefore responsible for co-ordination, promotion and regulation of the National Innovation System.

Working with partners, KeNIA strengthens interrelationships between actors in order to promote innovation and enterprise development out of research and ideas. From supporting the identification, recording and protection of innovative ideas to coordinating the establishment and implementation of appropriate policies, standards, processes, infrastructure, and partnerships to nurture the innovative ideas. The agency also works with partners to ensure appropriate prioritization, relevant capacity development, innovation recognition and publication of the same.

Core Mandate

To Develop and Manage the National Innovation System

Mission

To develop and manage a dynamic national innovation system that facilitates taking ideas to the market.

Vision

A key enabler of socio-economic development through innovation.

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Background

There is a consensus that Science, Technology, and Innovation (ST&I) lies at the heart of national development, and that investment in the ST&I is critical to ensuring long-term economic growth.

The African Union has embraced ST&I as key driver of economic development and urged Member States to incorporate ST&I in their development agenda. In Kenya, the centrality of ST&I in wealth creation, enhancing social welfare, international competitiveness, and the attainment of Sustainable Development Goals is espoused in the country's development blueprint, Vision 2030.

Despite the mainstreaming of ST&I in the national economic strategy, the framework for mapping and tracking the progress of innovation activities in the country is not yet optimised. This undermines the ability of the government, local stakeholders, and foreign investors to make rapid and evidence-based decisions regarding investing in the innovation ecosystem of the country.

In response, the Kenya Innovation Agency (KeNIA) has adopted a plan for continuous monitoring of the national innovation system and provision of regular updates through a national innovation report, here referred to as national innovation outlook.

This report, the first under this new dispensation, has two objectives:

1. To demystify and unpack the national innovation system.
2. To provide a broad overview of the successes, enablers, barriers, and opportunities in the Kenya innovation system.

This outlook is nevertheless limited in the depth to which the various components of the innovation system are examined considering the time constraints during the development of the report. Nonetheless, the report serves as a foundation upon which future reports can be iteratively improved.

It is projected that KeNIA will develop an annual report (potentially with emphasis on selected sectors) on the outlook of innovation in Kenya as a way of tracking progress and the process shape the ecosystem efforts for greater impact.

Acknowledgement

The report benefited significantly from work done by independent partners in the national innovation system. In the course of 2022, KeNIA worked with multiple partners to create reports that cover selected dimensions of the national innovation system. This report is an amalgamation of the five core studies that were commissioned by different partners in collaboration with KeNIA, which together provide an in-depth analysis of Kenya's current innovation status and outlook.

Specifically, the following studies were incorporated in this report:

a) Kenya Innovation Outlook Study - was commissioned in conjunction with the UK's Foreign, Commonwealth & Development Office (FCDO) and carried out by Africa Research and Impact Network (ARIN). The aim of the study was to establish a conceptual framework for examining Kenya's national innovation system, template for data collection and platform for live reporting of innovation outlook.

b) Mapping of the Kenyan innovation ecosystem - was commissioned in conjunction with the United Nations Development Program (UNDP) and carried out by the African Center for Technology Studies (ACTS) and KONZA Technopolis. The main objective was to interrogate the status of the Startup Ecosystem, the characteristics and organization (players and actors), challenges, and opportunities.

c) Understanding Startups Ecosystem in Kenya: Drivers, Challenges, and Opportunities - was commissioned in conjunction with the UK's FCDO and carried out by Kenyatta University, Maitri Capital, MegaCap, 1 Million start & KIRDI, outlining the evolution of the Kenyan Startup Ecosystem for the last 10 years.

d) Guidelines for strengthening commercialization in universities and research organizations in Kenya - was commissioned in conjunction with the Organization of African Caribbean Pacific States (OACPS). The main objective was to address the challenges that face technology transfer and commercialization in Kenya.

e) Guidelines for Coordination and Management of Innovation hubs in Kenya Organization of African - commissioned in conjunction with the Organization of African Caribbean Pacific States (OACPS). The main objective was to develop a framework for the coordination of innovation hubs.

KeNIA appreciates the support of the State Department of University Education and Research within the Ministry of Education board and the members of the board who provided necessary endorsements for this work to be done.

It is envisaged that KeNIA, working with partners, will continue to provide stronger national coordination of the innovation indicators for more effective reporting and tracking of the progress of the national innovation system.

Working Definitions

Confidential Information: This is any IP, information, or data of a confidential nature, including all oral and visual information or data recorded in writing or in any other medium or by any other method that should not be divulged.

Commercialization: The process by which any Intellectual Property assets may be adapted or used for any purpose that may provide benefit to society or commercial use on reasonable terms. It includes assignment, licensing, and establishment of spin-offs to offer the Intellectual Property as a product or service.

Copyright: Means an original work of authorship which has been fixed in any tangible medium of expression from which it can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device, such as books, articles, journals, software, computer programs, musical works, dramatic works, videos, multimedia products, sound recordings, paintings, pictorial, sculpture or graphical works.

Incubator: A program or facility that helps start-ups in their infancy succeed by providing workspace, seed funding, mentoring, and training among other support services.

Industrial Design: Rights granted to protect the original, ornamental and non-functional features of a product that result from design activity. The right concerns merely the appearance (the 'design') of a product, not the product itself. An industrial design has a term of protection of five years. It can be renewed for two consecutive periods of five years.

Innovation: The implementation of a new or significantly improved product (good or service), process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.

Innovation ecosystem/system: Complex network of people, organizations, institutions, government policy and regulations that support and promote innovation. It includes the interactions between people to take an idea and turn it into a marketable process, product or service.

Innovator: A person who transforms ideas into practical reality in the form of products, process or service.

Intellectual property (IP): Creations of the mind such as inventions; literary and artistic works; and symbols, names and images used in commerce for which proprietary rights may be obtained or enforced by law.

Patent: An exclusive right granted for an invention which provides the inventor with the exclusive right to prevent others from possessing, using, selling, manufacturing and importing the patented invention or offering to do any of these things within a definite geographical area. In Kenya, a patent is granted by the Kenya Industrial Property Institute for a period of 20 years from the filing date of application.

Plant Varieties: Comprise of given genotype or combination of genotypes distinguished from any other plant groupings by at least one characteristic. To be protected as intellectual property, the plant varieties must be new, distinct, uniform or stable.

Prototype: A small-scale, tangible representation of an idea or solution (or part of it) that people can directly experience. Prototyping allows for an idea to be communicated or presented to others in an interactive way and help gather feedback easily.

Publications: Books, textbooks, journal articles, booklets, bulletins, circulars, pamphlets, reports, information releases, exhibits, demonstrations, and other scholarly or popular writings regardless of medium.

Working Definitions

Royalties: Revenue received by an institution from a third party that is exploiting university IP rights through licensing agreement.

Spinoff: A company established based on research outputs from an institution of higher learning or research organization by the people working in the institution.

Start-up: An innovative business entity, which is scalable by design, created based on innovations developed to solve a clearly identified challenge in society.

Start-up accelerator: An organization that offers mentorship, capital, and connections to investors and business partners. It is designed for select start-ups with promising minimum viable products (MVPs) that have potential to rapidly scale.

Trademark: Any word, phrase, logo, name, symbol, device, sign or any combination thereof, used by a person or which a person has a bona fide intention to use in commerce and uses or applies to register, to identify and distinguish his goods from those of others which includes the container of the products or the packaging.

Utility Model: an invention that is new and industrially applicable and is usually sought for technically less complex inventions or for inventions that have a short commercial life and normally do not meet the patentability criteria.

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The Kenya innovation outlook is organized into Seven chapters broken down into four sections.

Section one (national innovation outlook) has two chapters which cover the introduction and exposition of Kenya's national innovation system. It also covers some analysis of the performance of the national system based on data collected from a set of studies recently done.

Section two (selected sub-sectors) elaborates on the progress and prospects of the commercialization and start-up ecosystems in the country. The two aspects are the strategic priority areas of KeNIA and shape the various interventions the Agency will focus on for the next several years. Commercialization systems are in their formative stages and when structured well, have potential to unlock tremendous value in society. The Start-up ecosystem in the country is showing significant progress, with new enterprises emerging, record investment being recorded, and jobs being created, aspects that are very relevant to the national economic development.

Section three (recommendations and way forward) articulates practical interventions for enhancing the national system of innovation. While we celebrate the progress so far, we recognize that the country is in a global context and practical medium-term interventions are necessary to optimise the current system and boldly position the country for the future.



Section One

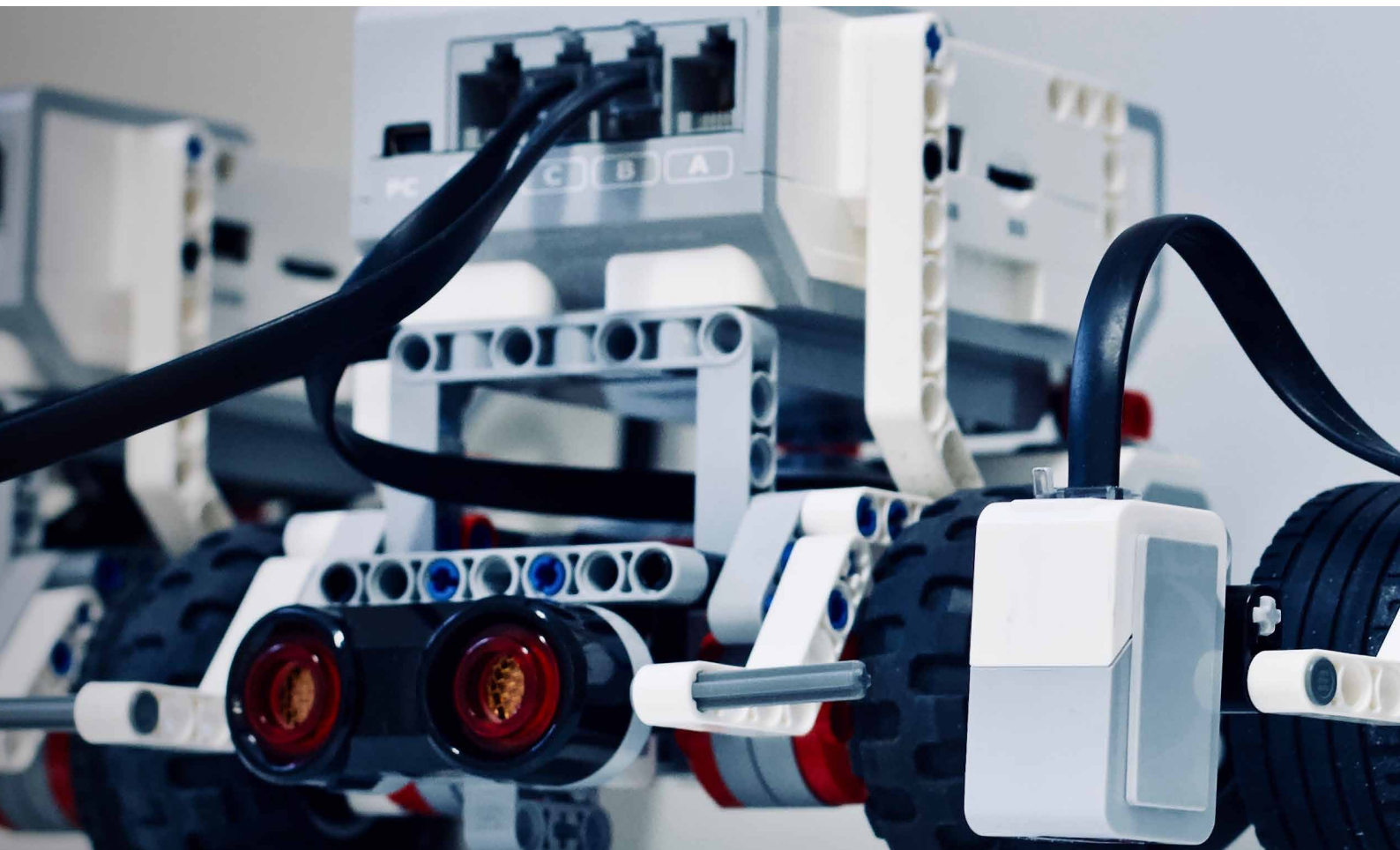
The National Innovation Outlook

Foundations to the Innovation system

In 2008, Kenya launched an ambitious long-term development strategy to become a globally competitive and prosperous nation by the year 2030. In recognition of the central role that Science, Technology, and Innovation (ST&I) plays in a modern economy by boosting wealth creation, social welfare, international competitiveness, and the attainment of Sustainable Development Goals (SDGs), ST&I has specifically been highlighted as one of the foundational enablers of the country's development master blueprint "Vision 2030". Following the launch of Vision 2030, the mainstreaming of ST&I in the country's development strategy has been operationalized through various policies and acts of parliament, the key ones being the ST&I Policy and Strategy of 2008 and the ST&I Act of 2013.

The 2013 ST&I Act underpinned the creation of a triple helix of ST&I oversight entities: The National Commission for Science Technology and Innovation (NACOSTI) to oversee the regulation of the national ST&I system; the National Research Fund (NRF) to manage research funds; and the Kenya National Innovation Agency (KeNIA) to facilitate the commercialization and uptake of innovations.

The country's Medium-Term Plan (MTP) tracks progress on the Vision 2030 through five years cycles. The current MTP shows that the country has experienced modest economic growth in the last decade. Among the key areas under tracking in the MTP is the growth of the ST&I sector.

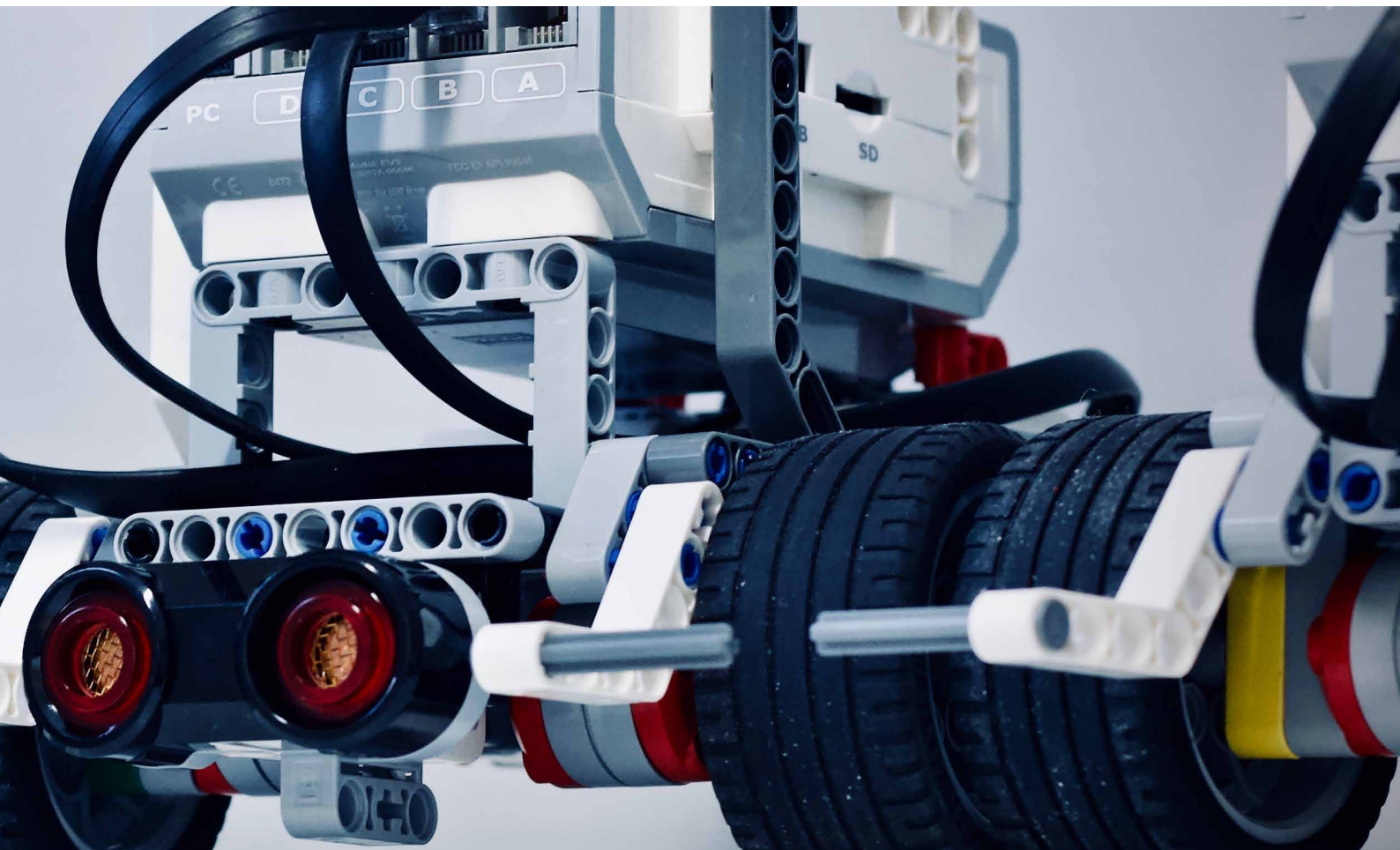


Economic Context

Kenya has had an increasing focus on innovation and technological transformations as key enablers for investments and service delivery market.

Kenya is the seventh largest economy in Africa. Kenya's economy is primarily market-based and is driven by agriculture (mainly export of cash crops such as horticulture, coffee, and tea, among others) and tourism. However, there is an increasing focus on innovation and technological transformations as key enablers for investments and service delivery. Through various regulatory reforms, the government of Kenya is focused on enhancing the business environment to enable local and foreign investments. Such initiatives include the creation of export processing zones, and supporting innovation hubs; for example, the Konza Technopolis, with special investment incentives and the creation of jobs.

The country's Gross Domestic Product (GDP) has been increasing over the last decade at an average of 5%, even though this growth was staggered by the impacts of COVID-19, slowing down from 5.2% in 2019 to -0.3% in 2020. However, in 2021, the country recorded a 7.5% economic growth increase that was driven by the COVID-19 recovery strategies and to some extent innovations in the services sector and industrial output (World Bank, 2022). Moreover, while the country's direct trade linkage with Ukraine is relatively moderate, Kenya's economy is vulnerable to commodity price shocks due to the ongoing war in Ukraine. The country is a net oil importer, thus an increase in the global oil prices translates to an increased cost of living. Due to the economic risks posed by the war in Ukraine, the projected economic growth in the years 2022 and 2023 is 5.5% and 5.2% respectively, relatively lower than the 2021 rate.



Demographic Context

Kenya is dominated by a relatively young population with about 60% of the current population falling between the 18-35 years old age bracket. The current population stands at 56.2 million, ranking 26th in the world and seventh in Africa. The country's average annual population growth rate is about 2.28% per year. The youthful population has been identified as a major opportunity for spurring innovation and digital transformation due to their vibrancy and readiness to learn new ideas and to adopt new technologies.



Kenya's demographic dividend presents an opportunity for transforming innovation through new ideas, the adoption of emerging technologies such as digitization, and a stronger labour



2.28%

Annual Population Growth



Education Context

The country's literacy rate stands at about 81.5% ranking among the top 10 in Africa. Over 16 million children and youth are enrolled in about 90,000 pre-primary, primary and secondary education institutions and another 0.6 million are enrolled in post-secondary, i.e., tertiary institutions such as colleges, TVETs, and Universities. The number of TVETs and tertiary education institutions doubled, as did enrolment numbers in tertiary institutions in the past decade. Provision is mostly public; enrolment in public institutions accounts for 70% of total enrolment in pre-primary, 84% in primary, 93% in secondary, and 82% in tertiary education. According to the World Bank's assessment of Kenya's economic outlook, the education sector outputs contributed significantly to the increase in the service sector value-added by 9.8% in 2021.

Kenya's education sector is a key foundation for innovation and remains a key catalyst for scaling up emerging innovations and value addition.



The Innovation Context

Defining Innovation

Despite the claims of innovation at all socio-economic levels from national, sectoral, institutional, and individual levels, there is no universal definition of innovation because it is relatively contextual and dependent on interpretation by different actors; academia, manufacturing, service providers, community-oriented organizations, and artists, among others. The varied definition of innovation and the need to have shared understanding what innovation entails for Kenya, inspired this outlook. The first steps of the outlook are intended to contextualize innovation and the associated indicators to encourage a deeper understanding and mechanisms for effective utilization among different actors, decision-makers, and investors, to name a few examples

“

Innovation: Creation of new or distinct improvement of products and processes in formal and informal settings that have disruptive positive effects on the economy, and the social well-being of the citizens.

”

Nonetheless, the Oslo Manual for collecting, reporting, and using data on innovation (OECD/Eurostat, 2018) defines innovation as “new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations”. Some literature review, for instance, Taylor et al., (2017), provides an in-depth review of the evolution of the term innovation, which contrasts with imitation and provides a composite definition of innovation as “the creative process whereby new or improved ideas are successfully developed and applied to produce outcomes that are practical and of value”. These definitions have elicited debates about whether an “innovation” is primarily associated with novelty and dramatic technological breakthroughs. The notion of dramatic change led to the perception that innovation only happens through formal knowledge, technological, or market processes and may not include informal processes that are increasingly driving economic development. Given the dynamic economic environment, the need to diversify sources of income, and recover from the effects of the COVID-19 pandemic, countries are moving towards a more holistic view of innovation to focus on both formal and informal products and processes.





For the Kenya Innovation Outlook (KIO), we have therefore drawn from the various definitions described above to propose a definition of innovation that is context relevant: **“Creation of new or distinct improvement of products and processes in the formal and informal sector that have disruptive positive effects on the economy, and the social well-being of the citizens”.**

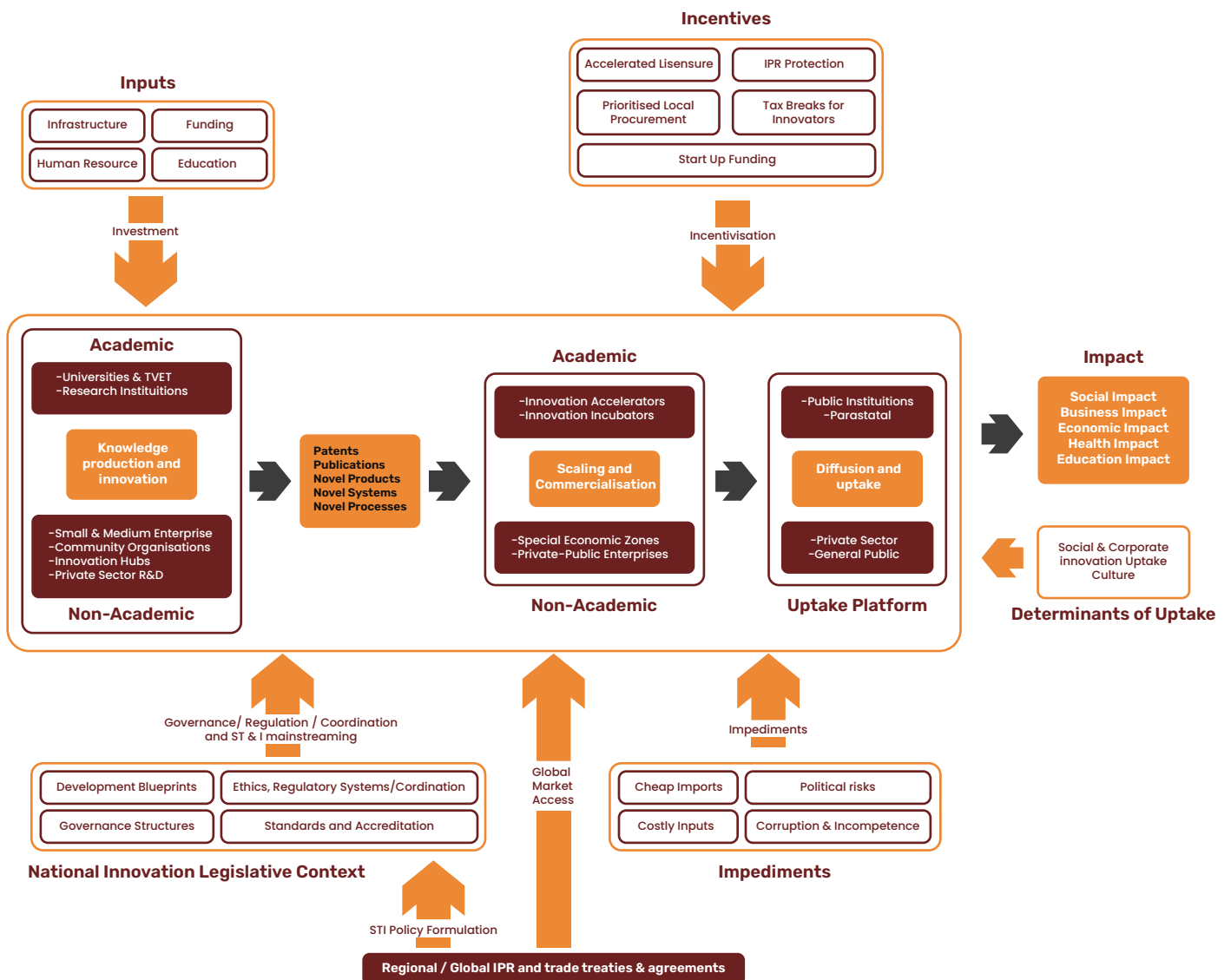
In the Kenyan context, the 2013 ST&I Act provides a more inclusive framing of innovation succinctly captured in five parts: “(a) a technovation model, utility model, or industrial design within the meaning of the Industrial Property Act, 2001 (Cap. 509); (b) a product, process, service or idea which is novel; (c) an improved use of a new product, service or method in the industry, business or society; or (d) indigenous or traditional knowledge by the community of beneficial properties of land, natural resources, including plant and animal resources and the environment; (e) any other non-patentable creations or improvements which may be deemed as deserving promotion and protection or sui generis intellectual property rights and “innovator” shall be construed accordingly”. Through this definition, Kenya aspires not just to pursue innovative ideas and technologies but ensure that these innovations respond to the country’s economic growth and poverty reduction as also stressed by Hall et al., 2003.

Innovation can also be categorized into different typologies based on the focus. Three typologies have widely been used in previous assessments: i) Process innovation defined as the implementation of a new and novel approach /method in a firm or institution, e.g., co-creating an idea with consumers to enhance market uptake; ii) product innovation which involves the creation of a new product brand or improving an existing brand to enhance utility and respond to consumer needs is an impactful way, e.g., smartphones or even a vaccine; and iii) organizational innovation which is synonymous to institutional innovation and involves new organizational structures and policies that enhance effective management and satisfactory service delivery to consumers/stakeholders. These forms of innovations can occur on different platforms including outside firms, in public spaces, and in educational spheres, and generate development and create wealth (GoK, 2012).

The National Innovation System

Innovation is not a linear process, its a complex system of actors and associated processes with inputs, outputs, enablers, impacts, and associated strategic niches. The interactions between different actors and processes that underpin innovations are encapsulated in the National Innovation Systems (NIS). While the conception of innovative ideas is normally the exercise of individuals or discrete teams, innovation does not happen in isolation, but is rather facilitated through and impacted by a multi-scale, complex, and dynamic network of social, legal, political, and economic factors. This intricate network collectively constitutes an innovation system that can be demarcated at increasingly wider and more complex scales ranging from local, national, and regional to a global scale; thus, allowing comparisons across systems (Rudskaia et al., 2018).

The use of the term “national innovation system” started gaining traction in development discourses in the 1980s. As is the case with the term “innovation”, multiple definitions of NIS have emerged over time. A common definition from literature is that the NIS “is a network or a system of interacting government and private companies (large and small), universities, government bodies whose activities and relations lead to the emergence, import, perfection, and spread of new technologies within national borders”. The cooperation of these organizations can be technical, commercial, legal, social, and financial, while the goal is the development, security, financing, and regulation of new areas of knowledge and technology. The key point in this definition is the relationships and interactions among institutions and resultant impacts.



National Innovation is mainstreamed through various national development blueprints and governed through national legislative and regulatory frameworks that define ST&I structures, accreditation standards, policies, and guidelines. The framework recognizes that for sustained resource allocation, ST&I must be integral to the national development vision and formally spelt out clearly in the country's development blueprints. In addition, national innovation systems operate within a global market space that is defined by international trade treaties.

Innovation life cycle / Value chain

Describes platforms and activities that directly drive the progression of innovation, from conceptualization through development, commercializing, diffusion, and uptake. Conceptualization of innovative ideas happens in several places such as communities, households, universities, TVETs, research centres, commercial enterprises, and non-government organizations.

Investments

Involves the inputs that are part of the critical drivers of innovation, for example funding, infrastructure, equipment and software, and R&D activities. Funding includes both private and public funds available in the country as well foreign funds. There may exist different types and forms of funds such as private equity, loans, grants, and special funds, among many.

Incentives

Involve economic and legal initiatives (specifically, incentives) that the government and other players have established to enhance innovations (e.g., tax breaks or credits) by reducing costs and bureaucratic barriers to scaling up and commercialization. These also include innovation awards aimed at encouraging innovations, among others.

Impediments

Factors that prevent the progression of innovations through the value chain to commercialization and scaling up. These may include cheap imports that price out local innovations from the market, and costly financial and time inputs occasioned by corruption and incompetence, which reduce the market competitiveness of local innovations.

Impacts

Impacts of innovation are expected to deliver socio-economic development benefits to citizens in most need. Such impacts include but are not limited to social wellbeing but extend to include the emergence of new networks and partnerships, job creation and demonstrable contribution to the GDP, political stability, and environmental sustainability.

Evaluating National Innovation Systems

The urge to evaluate any NIS is driven by both internal and external utility demands. Internally, countries need to constantly monitor the outcome and impact of their innovation activities on socio-economic development. The evidence from tracking progress informs the establishment of innovation governance structures, formulation of policies, and budgetary allocation to maximize benefits from the investments within their NIS. Externally, the evidence informs the ranking of countries on the global innovation index, which is also a measure of the countries' economic competitiveness. This in turn provides potential investors with a basis for selecting countries and sectors to invest in and is, therefore, a major booster for both internal and foreign direct investment.

To facilitate comparison between NIS across the globe, several international assessment tools have been adopted. The first attempt to provide harmonized indicators for measuring NIS was done in 1962 by the Organisation for Economic Co-operation and Development (OECD) Working Party of National Experts on Science and Technology Indicators. The series of statistical manuals they generated are popularly known as the "Frascati family" of manuals, in reference to the Italian town where they were first developed. Of these manuals, the Oslo Manual has been the international standard of reference for conceptualizing and measuring innovation since 1992. It has since been revised on three occasions to account for growing levels of understanding and adoption, the emergence of innovation frontiers, and to address evolving user needs.

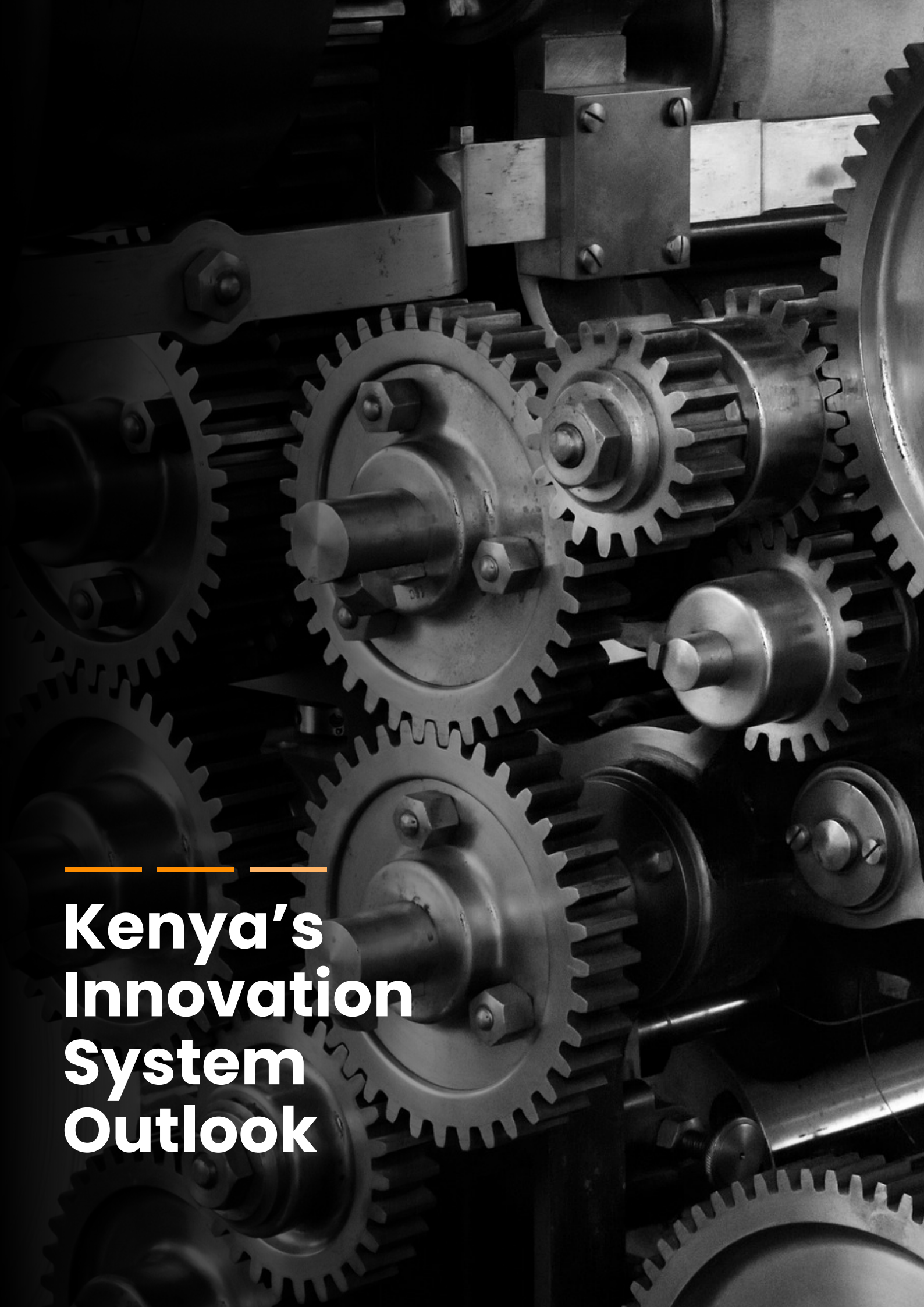
Several previous innovation assessments in Kenya and elsewhere in Africa, including the third generation Africa Continent Innovation Outlook 2019, the Kenyan Innovation outlook Report 2012, and the Kenyan innovation Survey 2015, have all applied the Oslo Manual. Prior to 2018, the innovation surveys according to the Oslo manual mainly focused on collecting data from the formal business sector. However, the revised Oslo Manual (2018) provides guidelines for measuring innovation in all sectors of the economy including the public sector and households. Countries should develop innovation data collection instruments that cover sectors of the economy such as government ministries (departments and agencies), education institutions, health institutions (e.g., clinics, hospitals, etc.), research institutions, consumers/Individuals, and groups not acting as a firm, social interest groups, and professional interest groups.

Given that innovation is embedded in formal and informal platforms with local markets, social, technological, governance, and organizational processes, all form key parts of an innovation system. It is recommended that these international manuals be adapted to the local context. Our approach, therefore, expands the delineation of the innovation space to include formal and informal innovation platforms and processes. Overall, the term innovation is nuanced with multiple terms and concepts that can be well understood as the concept becomes more practical. Some of the key terms that underpin innovation are outlined in Text Box 1.

The first attempt to map out the status of the country's ST&I sector was through the 2009/2010 national ST&I indicator survey. Additionally, the country has been a beneficiary of several strategic ST&I studies, supported by international partners especially the Foreign, Commonwealth, and Development Office (FCDO), through the East Africa Research and Innovation Hub (EARIH). This included a study on ST&I Metrics in Africa supported through the EARIH to support governments, investors, and donors to make better choices regarding ST&I investments using available ST&I indicators.

Similarly, the knowledge systems and innovation study commissioned by the FCDO through the East Africa hub provided a comprehensive assessment of the ST&I landscape in Kenya, Rwanda, and Tanzania using the knowledge systems lens. Recently, the East Africa Science Technology Commission (EASTECO) and ARIN collaborated in a research study to develop a country-specific web-based ST&I indicator for the region, with Kenya as a priority country. More broadly, Kenya is involved in various regional and international ST&I fora such as the Africa Science Technology and Innovation Indicators (AST&I), which aims to strengthen the capacity of African countries to collect internationally comparable ST&I indicators (see Figure 1).

These studies show that Kenya has a relatively high innovation potential compared to other African countries, and according to the Global Innovation Index 2021 (GII, 2021), the country ranked fourth in Africa. Overall, most assessments have focused on general ST&I indicators based on international standards, e.g., the Frascati and Oslo Manuals, and there have been limited efforts to break these indicators into granular forms relevant to the context and easily understandable and usable by decision-makers.



Kenya's Innovation System Outlook



Even though innovation is highlighted in Kenya's Vision 2030 and other blueprints, there is no consolidated visibility of innovation agenda in these blueprints. This provides an opportunity for the development of a National Innovation Masterplan. In this section we provide an analysis and performance of selected indicators in the national innovation system.

The role of Science Technology and Innovation in the Kenya development plans is anchored in the Vision 2030. In a nutshell, Vision 2030, first mooted in 2008 aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by the year 2030 in a clean and secure environment. The achievement of the Vision is predicated on the coalescence of three pillars that focus on economic, social, and political programmes for national development. Science technology and innovation is highlighted as one of the foundational enablers underpinning all the three pillars. The government of Kenya has built the development ambitions under the Vision 2030 on innovation for businesses and job creation.

Innovation is cited across the three Vision 2030 pillars and identified as a catalyst for achieving the goals of the pillars. While innovation is not discussed in detail in the Vision 2030 pillars, some elements of innovation such as research, education, and technology development are widely recognised as foundational actions and investment areas to support the Vision. Drawing from the main Vision document, the current government (2013-2022) established the Big Four Agenda focusing on four priority areas for socio-economic growth: universal health care, food security, affordable housing, and manufacturing. The Second Medium Term Plan of Vision 2030, (MTP2, 2013-2017), recommends intensifying the coordination of technology, innovation, research, development, and commercialization for economic growth.

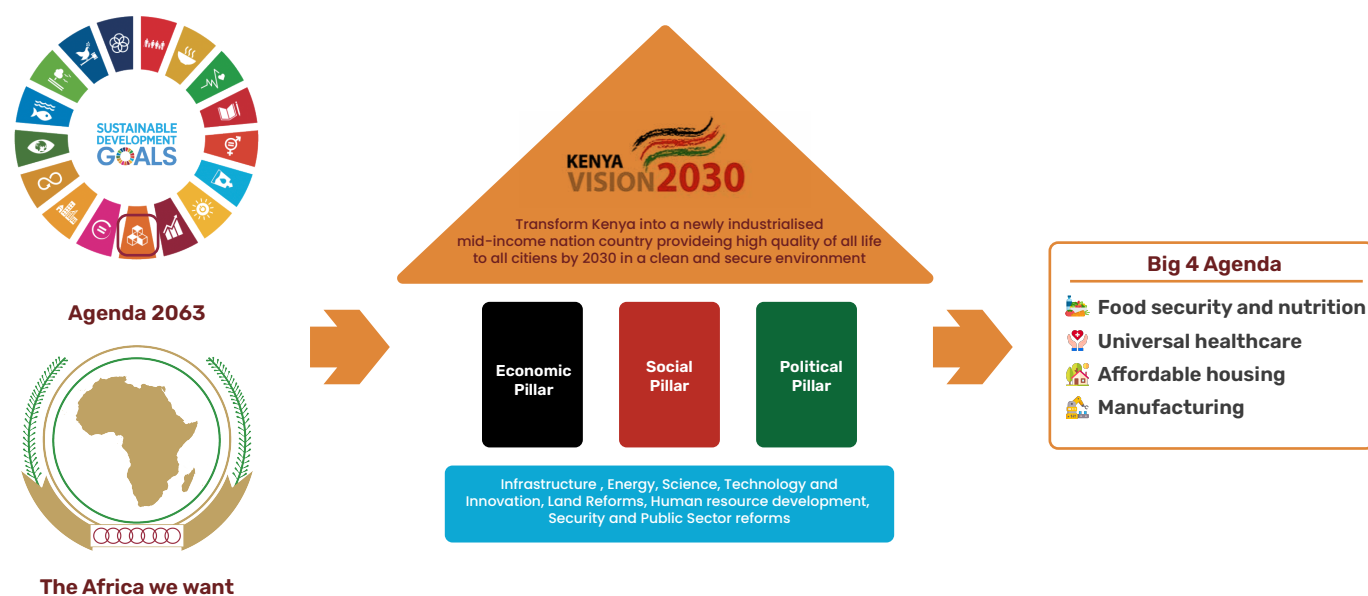


Illustration 1: Key economic blueprint documents underpinning the mainstreaming of ST&I in Kenya's development planning

The country has also developed sector specific innovation blueprints. The Ministry ICT, Innovations and Youth Affairs has developed a Digital economy blueprint (2019) focused on progressing innovation through harnessing the resources and value addition. The Kenya National ICT masterplan (2013) aims to promote digital economy for efficient governance, service delivery, and skills development. There are other sectoral blueprints that have not been considered in this outlook even though they have some elements of innovation.

While the innovation agenda is mentioned in various national blueprints, there is limited consolidation of innovation agenda in these blueprints. The Kenya National Innovation Agency (KeNIA) is taking lead in strengthening the visibility of innovation in the country's development agenda. The Agency is currently developing a 10-year National Innovation Masterplan and various specific flagship programmes that could exemplify and clarify the innovation agenda in the country's development blueprint.

The assessment reveals that a very small share of the total programmes in all Government departments i.e., less than 10% of the total programmes on research and development is focused on innovation or its elements. Due to lack of consolidated innovation agenda, it is a challenge to identify innovation-related programmes. While most programmes, e.g., special entrepreneurship funds (women, youth) have innovation elements such as value addition, innovation is not primarily their agenda.



Relatively clearer innovation support programmes are identifiable within the Ministries of Education and ICT, Innovation and Youth Affairs. Under the Ministry of Education, KeNIA for instance has embarked on developing specific support programmes such as the national guidelines on commercialization, aimed at accelerating the commercialization of innovative ideas and establishment of the coordination mechanism for incubation and innovation hubs, which are clear-cut efforts towards facilitating innovations.

The funding allocation for ST&I Agencies established under the ST&I 2013 act (NACOSTI, NRF and KeNIA) remain below 2% of the GDP in 2021 and has been increasing slightly at a rate of about 1.3% over the last three years (UNCTAD, 2021). There is other innovation-related funding that go to other Ministries such as ICT and Trade, but it is a challenge to extract what exactly goes to innovation.

Overall, Kenya is making progress in mainstreaming innovation in development blueprint. The 2021 Global Innovation Index report indicates that Kenya performs above expectation in innovation relative to her income level as a lower-middle class country. The country ranks 9th out of 34 globally, and 3rd out of 27 LMICs in Sub-Saharan Africa.

Innovation Policies

Kenya is making good progress in the innovation policy domain anchored on the ST&I Act of 2013, but most policies and plans are regulatory in nature. More effort is required towards facilitative policies e.g. commercialization policies and/or strategies.

In the policy sub-domain, three main indicators were identified: the presence of innovation policies more generally, share of innovation-specific policies as a percentage of all R&D policies and presence of long-term strategies/plans. These indicators can be broken down further but for the purposes of this study, Kenya has developed more than 10 policies and plans relevant to innovation in addition to the national blueprints that stipulate innovation as discussed above.

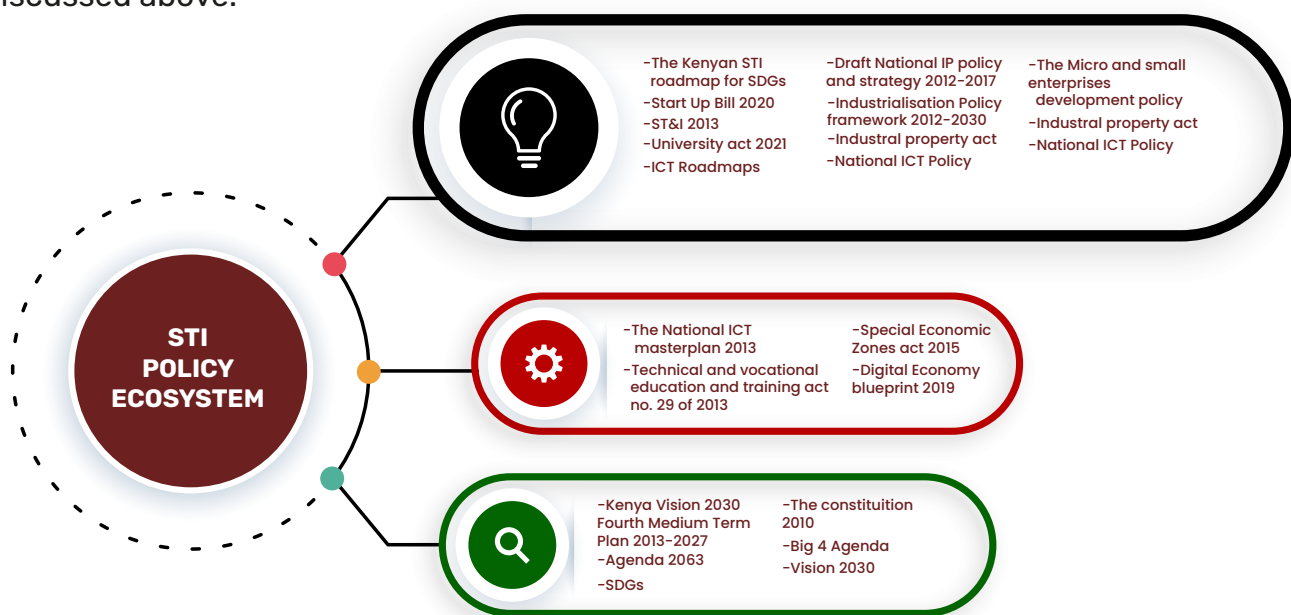


Illustration 3: Blueprints laws and policies underpinning innovation in Kenya

The primary document guiding innovation investments in the country is the ST&I Act of 2013. The Act established KENIA, NACOSTI and NRF, and stipulated the entities' mandate for promotion, coordination, regulation, and funding ST&I. The draft ST&I policy of 2019 provides a framework for coordinating innovation across sectors and Ministries, mainstreaming of ST&I into all sectors of the economy, and promoting the buy Kenya build Kenya agenda to promote competitiveness and consumption of locally produced goods among others. The policy is premised on increasing R&D to improve efficiency by incentivising productive sectors and strengthening university, industry, and government linkages for impact.

Other policies which are in various formative stages, such as the IP draft policy, Start-up Bill, Industrial Property Act, are key in promoting commercialization of innovation ideas from both formal (e.g., Universities) and informal (e.g., indigenous knowledge) sources. From a long-term perspective, Kenya is yet to develop a consolidated innovation framework to guide innovation activities across sectors. Instead, the existing policies are sector specific. Emerging long-term frameworks such as the Country's Digital Economy Blueprint and the envisaged National Innovation Master Plan provide opportunities for consolidating the innovation agenda across sectors and accelerate economic growth in Kenya.

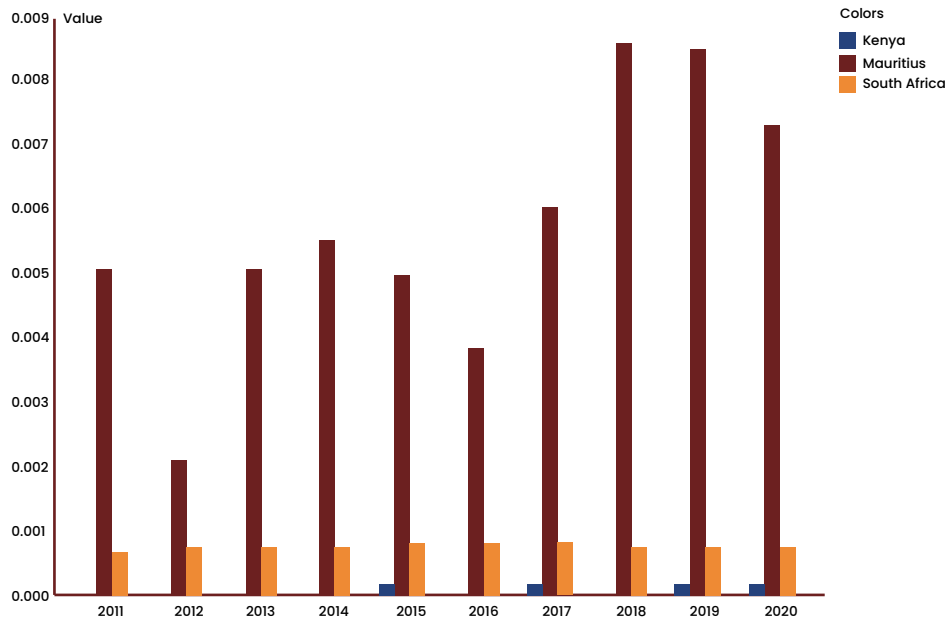


Illustration 3: Number of IP policies submitted by Kenya - Source: WIPO, 2021

Despite the relatively progressive policy outlook, interviews with relevant authorities revealed that weak enforcement of IP policies is a major challenge to innovation in the country. The National IP Policy and Strategy of 2012-2017 is still in draft form, with only the establishment of four semi-autonomous institutions for management and administration of IP. Compared to other African countries, Kenya has submitted significantly low number of IP policies per capita to WIPO. Part of the challenge relates to lack of a dedicated and empowered agency to operationalize this process or support the overall coordination. The IP policies are also not well mainstreamed in the innovation platforms such as universities and research institutions, most of which, consequently, lack frameworks to recognize and promote innovations.

Graph 4 provides the Number of IP policies submitted by Kenya compared to the best performing Africa countries in the GII (Mauritius and South Africa) as a share of total population.



Illustration 3: International innovation policies and guidelines to which Kenya is a signatory

International treaties and agreements impacting on the Kenya innovation system.

Kenya has signed most international treaties but has not developed a framework to evaluate their effectiveness. Three main indicators are prioritised in this sub-domain, i.e., the number of treaties Kenya has signed, availability of domestic implementation mechanisms/process, and the investment value/opportunities of these treaties. In terms of number of treaties, Kenya is a signatory to various international policies on innovation.

Out of a sample of eight (8) key international laws relevant to innovation, Kenya has ratified seven (7) of them. Indicatively, this shows potential alignment to the international policy systems. Some efforts are required to strengthen the domestication of intellectual property policies. Through international frameworks such as the Patent Cooperation Treaty (PCT), Kenya can protect its IPRs and learn best practices from other countries.

Kenya is also part of existing assessment frameworks for monitoring and reporting innovations at regional and global levels, e.g., the Africa Outlook, the AU-NEPAD Research and Development Surveys; and the Global Innovation Outlooks (e.g. GII, UN science surveys; the OECD surveys). Despite signing most of the treaties, there is very little information on the effectiveness or impacts of these treaties in the Kenyan innovation or wider ST&I pursuit. There is a lack of framework to evaluate these treaties from a domestic context, i.e., how well they are domesticated, existing structures, and value-addition to the country's innovation outlook.

Ministry	Regulation & Funding Accreditation		Marketing & Investment Promotion Authorities	
Ministry of Industrialization, Trade and Enterprises Development	Anti-Counterfeiting Agency (ACA)	Kenya Industrial Estate (KIE)	Kenya Export and Promotion Branding Agency	Kenya Industrial Property Institute (KIPPI)
	Kenya Bureau of Statistics (KNBS)	Kenya Development Corporation	Brand Kenya Board	Micro and Small Enterprises and Authority (MSEA)
	Kenya Copyright Board (KeCoBo)		Kenya Investment Authority (KenInvest)	Special Economic Zones Authority
	Kenya Accreditation Service (KENAS)			Export Processing Zones Authority (EPZA)
Ministry of Education	Commission for University Education (CUE)	National Research Fund (NRF)	Kenya National Innovation Agency (KeNIA)	
	National Council of Science, Technology, and Innovation			
Ministry of Health	Drug Policy and Planning Centre (DPPC)			
	Poison and Pharmacy Board			
Ministry of ICT, Innovation and Youth	Communication Authority of Kenya (CAK)			Department of ICT and Innovation and Youth
Ministry of Agriculture, Livestock, Fisheries	National Environment Management Agency (NEMA)			

Innovation Governance Structure

Kenya's innovation governance structure is concentrated on the regulatory functions and less on the facilitative functions (e.g., marketization, funding etc.). Providing dedicated support to the lead Agency, the Kenya National Innovation Agency, could steer facilitate more innovation and less regulatory restrictions.

Innovation governance structures refer to the institution as mandated to oversee innovation in the country. Five indicators were identified as relevant here including: presence of a national dedicated innovation Agency, number/share of government entities dedicated to ST&I, number of staff in innovation Agency, qualification of top leadership, levels of qualification of staff in ST&I Agencies, and availability of coordination mechanism. Table 2, shows a schematic representation of the State ST&I governance Agencies and their responsibilities. There are more than twenty (20) other state agencies from across five (5) Ministries playing different roles. The outlook shows that most agencies play regulatory and accreditation roles, but fewer are involved in funding and marketing and promotion.

The regulatory functions are critical in safeguarding innovations but might not necessarily catalyse innovations and might be restrictive in some instances. Kenya, through the ST&I Act 2013 established a dedicated State Agency, the Kenya National Innovation Agency to promote innovation.

The Kenya National Innovation Agency is a key player in catalysing innovation and has recently developed programmes for promoting innovation such as:

- The Innovation Bridge Platform, that links innovators to market actors/investors (<https://bridge.innovationagency.go.ke/>)
- The commercialization guidelines to operationalization of national and institutional best practices for commercialization
- The Research to Commercialization (R2C) Accelerator (<https://academy.innovationagency.go.ke/research-2-commercialization>) to support commercialization of research output
- The KeNIA Innovation Academy (<https://academy.innovationagency.go.ke>) to support building innovative capacities of interested individuals and support integration of innovative practices into institutions.
- The commercialization institutional support program aimed at supporting universities and research centres to enhance their institutional systems for commercialization of research outputs.



In addition, the longer-term National Innovation Masterplan under draft could enhance synergy in innovation across different sectors. These place the innovation agency at a strategic position to catalyse innovations by leveraging on activities of other agencies and ministries such as ICT (currently implementing a digital economy blueprint).

While there is an opportunity to shift efforts from a regulatory governance structure to a more facilitative/catalytic governance structure, the capacity to do so remains weak in most agencies. For instance, a sample survey of the staff outlay in key ST&I agencies, e.g., NACOSTI, NRF, and KeNIA showed inadequate staffing limiting the potential to achieve the stipulated mandates.

The entrepreneurial, fundraising potential and analytical skillset as well as relevant academic qualification, e.g., PhD, are pre-requisite for steering transformative interventions and governance shifts of the institutions. But even with qualified leadership, availability of enough and qualified staff and team members remains key.

In terms of coordination and synergies, the country currently lacks a clear mechanism on coordinating the innovation agenda of various ministries and their respective agencies. This has reduced the opportunities to develop synergies and create interministerial partnerships to catalyse innovation and minimise conflicts. Multiple agencies working in silos also result confusing information regarding critical innovations in the country.



Globally, Kenya ranks around position 80 on institutions and 92 on regulatory quality, measured in terms of perceptions of the quality of services stimulated by public policies, perception of policy stability, e.g., from political pressures, and the quality of policy formulation and implementation as well as Government's commitments (GII, 2021).

This is an average performance, relatively distant from the leading African country (Mauritius) ranked at position 21 on institutions. Even though the country is making good progress in institutional development, some of the challenges highlighted above are important.

Reflecting on best governance practices elsewhere, Kenya has an opportunity to learn from Mauritius which leads the Africa's innovation landscape on indicators such as institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge, and technology outputs (GII 2021).

Mauritius has specifically strengthened its facilitative governance model through strategic stakeholder partnerships including PPPs that have grown its innovation and technology sector. The Mauritius Research and Innovation Council (MRIC) recently signed an MoU with the UNDP to enable sharing of data on the innovation ecosystem in Mauritius and to facilitate joint research, multi-stakeholder experiments, and programs.



Regulatory and accreditation mechanism

This sub-domain overlaps with the governance sub-domain but is mainly focused on enforcement. Three main indicators are prioritised here - availability of dedicated enforcement agencies, share of successful legal cases on innovation, availability of tribunals established to oversee innovation and property rights, and share of patent approvals against number submitted.

Kenya has dedicated agencies to protect innovations through intellectual property rights and patenting. The Kenya Copyright Board (KECOBO) is a State Corporation under the Office of the Attorney General & the Department of Justice, established by section 3 of the Copyright Act 2001 and administers and enforces copyright and related rights thus protecting innovation ideas from piracy and counterfeits. Additionally, the Kenya Industrial Property Institute (KIPI) was established in 2002 under the Ministry of Industry, Trade and Cooperatives to administer Industrial Property Rights, and to provide technological information to the public.

In terms of patents registered and defended, about 38% of patents submitted, were registered with KIPI between 2016 and 2019 with only 8% of these being approved (KIPI, 2019). During the stakeholder interviews, there were concerns, especially from universities, that the patenting and regulation for research is weak, with instances where patents have been lost under unclear circumstances.

Key challenges to IP enforcement, as identified by stakeholders, include lack of prompt responses to queries, and long patent registration time coupled with the fact that some applicants are not familiar with the registration requirements and the documentation. At the same time, high turnover of patent examiners impedes adequate and informative consultations between patent applicants and examiners.

Some applicants resort to withdrawing their patent applications, subsequently resulting in very low numbers of patent applications in the country over the years. This lack of enforcement has created volumes of counterfeit products in the Kenyan markets. The low numbers have also been attributed to the lack of promotion of innovation-centric education in higher learning institutions while increased counterfeit is because of a lack of enforcement of standards.



Discovery phase/ Knowledge generation

Kenya's knowledge-producing platforms are increasing but the number of innovation-relevant knowledge is still very minimal thus need for innovation-specific courses and academies to strengthen the production of innovation-relevant knowledge.

Academic Platforms

As of 2021, there were a total of 21 research institutions in Kenya out of which 11 are public and 10 are private. The number of universities and TVETs has been increasing in the past decade as shown in Table 4.

The number of universities increased from 66 to 74 between 2015 and 2020, an increase of 12.12 % in five years. Similarly, the number of Technical Vocational Education and Training institutions in the country rose significantly by 87% from 874 to 2,191 between the years 2015 and 2020. By design, the increase in numbers of TVETs signals opportunities for more technical skills to transform ideas into practical initiatives.

The Government has made deliberate investments in the establishment of TVETs, recognizing their role in driving practical innovations for economic growth and employment for the increasing number of youths. Despite the Government's efforts to increase support, of these TVETs face some challenges especially inadequate funding 2017; Akala & Changilwa, 2018.

In other words, investments in TVETs are more focused on their establishment but less on their operations thus challenging the overall objective around practical skill development and job creation.

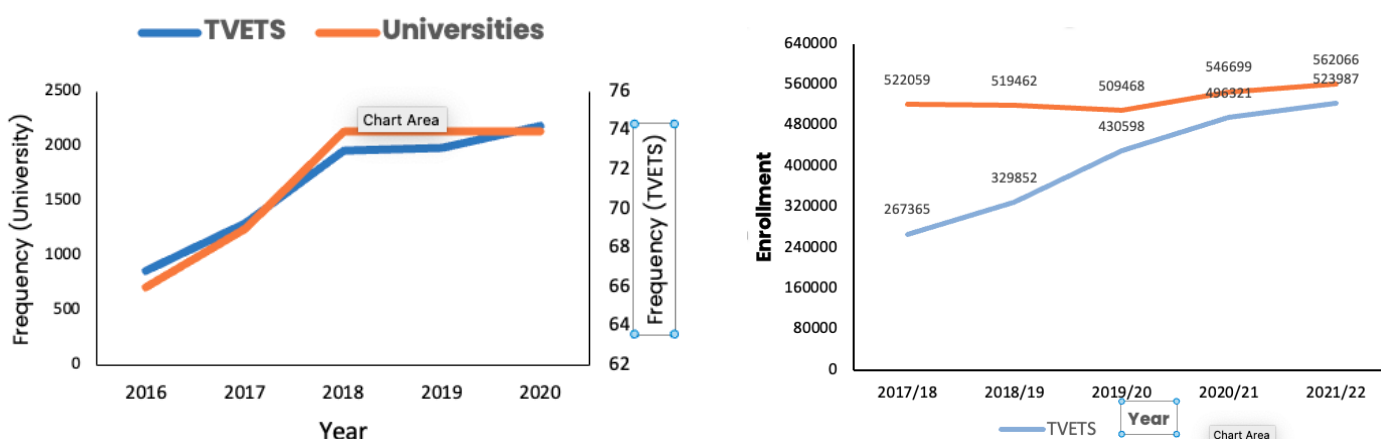


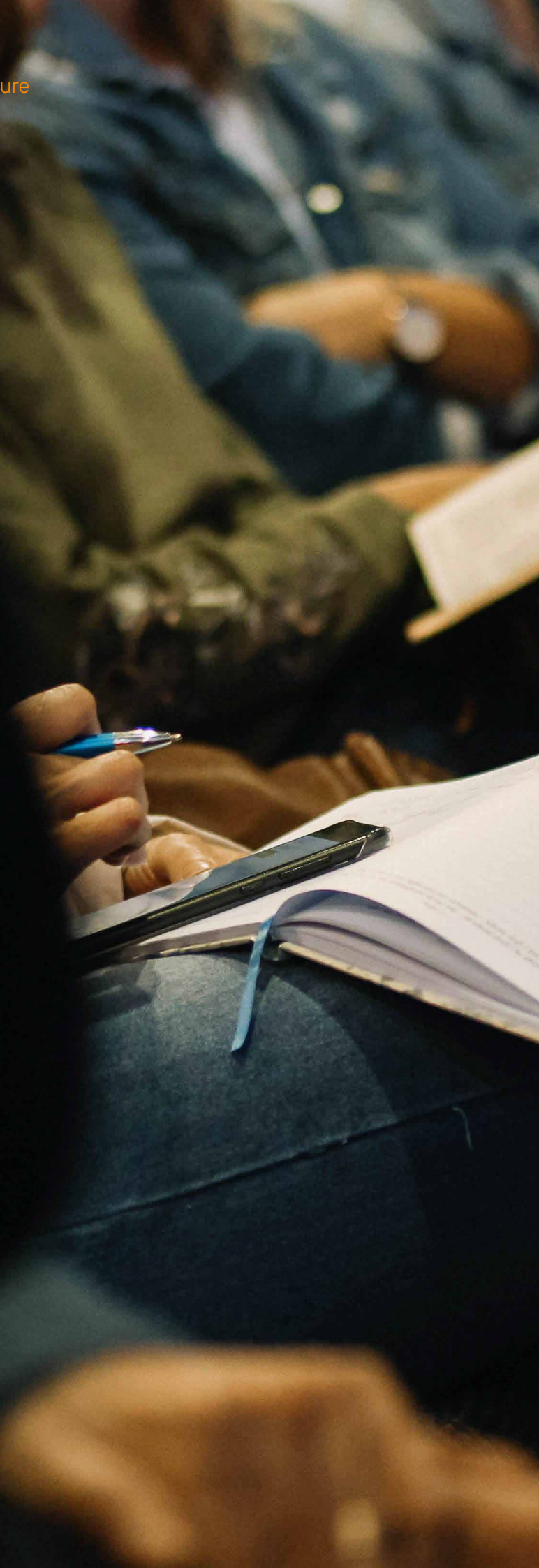
Illustration 3: Number of universities and TVETs in Kenya between 2015 -2020 and enrolment 2017-2022 (in thousands) Source: Commission for University Education, 2020 / KNBS Economic Survey, 2020

The expansion of TVETS and Universities has resulted in a significant increase in student enrolments. Between the years 2015 and 2020, the TVET subsector recorded a significant increase in enrolment of approximately 70% from a total of 142,410 in 2015 to 430,598 students in 2020 (Figure 15). The upsurge in TVET enrolment over the years is occasioned by the Government's deliberate effort to sensitize students on the relevance and benefits of TVETS accompanied by tailored incentives such as special funds e.g., the Youth Fund.

The enrolment in the university however recorded a 7% increase between 2015 and 2021 (KNBS, 2020). The relatively small increase in enrolment rates can be attributed to the decrease of self-sponsored students, the availability of alternatives such as TVETS, the Covid 19 pandemic, and the ongoing reforms in the education sector.

In terms of the subject area, only 16% of students graduated from STEM subjects between 2016- 2021 indicating that there is a need to support more enrolment of both males and females in STEM courses even though this is expected to increase in 2022. Out of this, only 30% were female - signalling a gender imbalance that needs to be addressed. In terms of research, Kenya has 225 full-time researchers per million inhabitants. This figure, although impressive amongst Kenya's EAC peers (e.g., Tanzania has 26.5 researchers per million inhabitants) is still dismal by global standards in innovation related R & D. There is need for more researchers who would dedicate their time and expertise in strengthening the governance structure in the innovation sector.

There has been a modest increase in research activities and associated outputs. According to the economic survey of 2021, doctoral and postdoctoral researchers that were granted research licenses in were 781 in 2016/2017 1,129 in 2018/2019, and 1,046 in 2019/2020 (Kenya National Bureau of Statistics, 2021). In terms of research, there was a slight decrease in the number of research licenses granted to individuals and institutions from 2017-2020.



The number of research license applications to NACOST&I declined by 1.5% from 6077 in 2019/20 to 5,985 in 2020/21, while the total number of licenses granted decreased from 6,112 in 2019/20 to 5,153 in 2020/21 (KNBS, 2022). This could be attributable to the COVID 19 pandemic that affected businesses, and academic and research institutions that had to adhere to the containment measures.

The number of funds disbursed for the successful research funding applications was Kshs 59.9 million in 2019/20 while the number of applications for multidisciplinary research funding was 811 of which only 58 were successful. In 2019/20, the number of funds disbursed for the successful multidisciplinary research funding applications stood at Kshs 506.73 million. Based on the surveys and stakeholder engagements, the performance in knowledge generation is highly hinged on funding. Measured as Investments in the Research and Development (R&D), Kenya invests 0.7% of GDP in R&D and this is relatively lower than the global average of 2.63% and the aspirations of the ST&ISA 2024 on 1% GERD. Narrowing down to the expenditure on education the percentage of GDP expenditure on higher education slightly increased by 0.1% and currently stands at 5.3%.

In comparison to other countries in Africa and the world, the % of GDP expenditure on education is slightly higher than that of Mauritius and relatively lower than the South African value (Figure 16). The allocation spent on research and development is also lower than the UK but slightly higher than the Mauritius allocation and at par with the South Africa allocation. Kenya also needs to enhance the university-industry linkages to promote innovation uptake and commercialization.

The Country's enrolment in tertiary institutions is relatively lower compared to the regional and global giants and thus needs improvements. The human capital is also low thus corresponding to the lower enrolment rates and the poor university-industry linkages. Overall, Kenya has a chance to improve on the knowledge platforms to improve performance through enhancing innovation-oriented training/skill development and courses which are currently weak in universities, research organizations, and TVETS.

Non-Academic platforms

Non-Academic platforms are knowledge-generating sources outside Universities/TVETS and research institutions including private firms and CSOs. Some of the identified indicators here include the Number of NGOs involved in knowledge and innovation-led activities; the percentage of manufacturing firms with a focus on R&D; Private R&D firms; State-funded R&D entities; University-Industry collaboration among others.

Kenya is making progress in the area as the number of firms embracing R&D through strategic collaborations is increasing. Latest data from the Second National Innovation Indicators Survey 2015, indicate that the % of manufacturing firms in 2014 that cooperated with universities or other higher education institutions was about 61 firms out of 100. Kenya ranked No. 1 in 2014 in Africa.

The analysis above gives an overview of knowledge producing platforms from both academic and non-academic sources. The analysis is relatively bias towards the Universities and TVETS with little in-depth focus on other research institutions that also produce knowledge e.g., National, and international research organisations that play key role in the country's knowledge systems.

Despite this limitation, the overall trend indicates that the country is experiencing an increase in knowledge producing platforms and outputs both in terms of graduates and publications. As part of the innovation value chain/life cycle, the next steps is to transform these ideas into marketable products through a commercialization/development process as outlined in the next section.



Frontier subdomains and recommendations

There are four main frontier subdomains were identified through stakeholder ranking of relevance. The frontier sub-domains provide opportunities for interventions.

Innovation policy

Innovation policy is a frontier sub-domain under the "National and Global Policy and Economic context". Kenya has mainstreamed innovation in its national blueprint, but this can only be operationalised through effective policies.

Currently, the ST&I Act of 2013 presented a critical juncture in Kenya's innovation journey by establishing a dedicated national Agency to promote innovation ideas and creating a national fund supportive to innovative research ideas.

While stakeholders view policies as key, there is a huge opportunity to transform the country's innovation through establishing more facilitative policies that are less restrictive e.g., commercialization guidelines, strategies etc. There is need to create a consolidated visibility of innovation agenda in the country's development blueprints through a long term National Multi-Sectoral Innovation Masterplan.

Funding

Funding is a sub-domain of Kenya's Innovation Outlook under the "Investment " domain. Funding was identified to be a major gap across all the KIO 2022 domains - from the innovation conceptualisation, development/commercialization to impact. Generally, funding of ST&I sector remains low (as discussed in section 3.4) while there seem to be some progress in funding start-ups and enterprises especially from Foreign Direct Investments and special funds such as women and youth funds. There is need to connect the enterprise/start-up funding to university research through establishing University-led enterprises or strengthening University-enterprise linkages that directly draw from the various publications.



Commercialization

Commercialization is a frontier sub-domain under the "Innovation Life Cycle" domain. There is general agreement that Kenya's knowledge production outlook is relatively progressive following investments in various knowledge production platforms such as Universities and Research Institutions.

However, the country is experiencing a major challenge in translating the increasing amounts of research outputs into commercial products. This has created notion around weak research impact and subsequent low public and private investments in R&D.

While Kenya is attracting domestic and foreign investments towards establishing platforms for commercialising especially outside academic platforms e.g., start-ups and incubation hubs, investments in commercialization in academic platforms remain weak.

Strengthening commercialization units e.g., TTOs, incubation centres within academic platforms through capacity, funding etc. presents a huge opportunity to turn huge amounts of research lying on the shelves into market products that could spur economic growth and job creation.

Business process incentives

Incentivising business processes i.e., ease of doing business is a frontier sub-domain of Kenya's Innovation Outlook under the "Incentives" domain.

Incentives on business process are prioritised because they could impact on wider spectrum of innovators. Various incentives exist but are relatively small scale to spur development of innovation ideas, but the impacts of these incentives are unclear and untracked.

There is need to develop an institutionalised incentive scheme strategy with clear budgetary allocation, coordination and impact tracking system.

Economic Impacts

Economic impact of innovation is a frontier sub-domain of Kenya's Innovation Outlook under the "Incentives " domain. Economic impacts of innovation activities are central to the country's development blueprints.

The policy support towards innovation is widely hinged on economic results such as job creation, contribution to GDP as well as poverty alleviation. More specifically, innovation as a sector can contribute to enhancing the local production capacity of manufacturing firms by exploiting opportunities that have been afforded by the pandemic, such as; production of hospital beds and ventilators, masks, disinfectants, protective personal equipment (PPEs) and sanitizers; mapping of micro-enterprises in manufacturing engaged in production of essential goods (such as PPEs) and other innovations in response to COVID-19.

Nonetheless, there are no clear framework to track economic impacts of innovations. There is need to align or strengthen the innovation outlook (led by KeNIA) with the national economic outlook (led by KIPPRA) to establish clearer connections.

Structural inefficiencies

Structural inefficiencies are a frontier sub-domain of Kenya's Innovation Outlook under the "Impediments " domain.

Structural barriers especially incompetence and corruption are key impediments to innovation resulting in loss of innovation ideas as well as ushering in counterfeit products that outrun and demoralize innovation.

There is a need for certain systemic reforms, including those that deal with infringers and protects innovations from piracy and counterfeits.





Section Two

Commercialization And Start-up Ecosystems

Introduction

For purposes of this chapter, the report explores commercialization in the context of how research outputs find their way to creating commercial value in society. Research outputs are primarily from Universities and Research Centres. The outcomes of the process of commercialization would be startups, joint ventures, spin-offs and possibly social ventures and solutions of public good.

Platforms for commercializing knowledge products are becoming prominent but are small-scale, uncoordinated, and not properly linked to the knowledge producing platforms. Commercialization is key in turning the increasing number of knowledge products into marketable products, industrialization, and ultimate job creation and economic growth.

Even though the commercialization rate of innovations is still low in Kenya, the number of platforms aiming to commercialize innovations has generally increased in the recent years. The proliferation of innovation hubs and technological advances in Kenya has led to increased interest in converting ideas into resource streams through commercialization.

The establishment of technology transfer offices (TTOs) in the universities and research centers has received policy attention in the recent past as a way of catalyzing research commercialization. Despite such efforts, survey results show that most TTOs lack adequate capacity including staff and funding to effectively commercialize research products/ideas. In most universities for instance, researchers are not aware of the existence of TTOs or their functions- i.e., the connection between the TTOs and researchers are very weak.

This is further complicated by IP policies that are either weak or not yet well mainstreamed in the innovation platforms such as Universities and Research Institutions. For instance, academic and research institutions lack adequate capacity to draft patent applications for their innovations and successfully commercialize their innovations.

There is a need for a clear innovation commercialization framework/guideline that Universities and research institutions can adopt.

Non-Academic platforms



Traditionally, the roles of the university were to educate students and to conduct basic research. Over the years and throughout the scientific revolutions, universities have taken on another role, becoming central players in regional and national economic development (Breznitz et al., 2008).

The emergence of the knowledge-based innovation economy has externally influenced academic structures and internal developments of academic entrepreneurship in the universities (Yusof and Razak, 2009).

In recent years, universities are assuming a third mission, contributing to society and economic development more directly (Powers, 2003). Today, academic research is increasingly pursued for its commercial potential and value, as intellectual property that can be exploited for financial gain (Clark, 2004).

Institutions of higher education are extraordinarily dependent on external resources, be it financial resources, legal mandates and economic incentives (Powers, 2003), hence research institutions and universities have become increasingly active in the commercialization of university inventions, and they are becoming more entrepreneurial (Clark, 2004).

To analyze the commercialization realities in Kenya, the report breaks down three crucial dimensions i.e., National Realities, Institutional settings, and Individual context. Each of these dimensions is analysed below, with specific recommendations provided. The summary below is generated from tremendous work done by KeNIA through partnership with the Research and Innovation (R&I) arm of the organization of the African Caribbean Pacific States and the European Union.

“

When research outputs are not commercialized, the researchers, institutions and the country at large loose tremendous potential to create job, enterprises, income and other related opportunities.

”

National Environment

Below are findings point to gaps and opportunities to streamline national coordination. The Kenya National Innovation Agency, working with various partners is exploring mechanisms to fill these gaps and hence make the national system more effective.

(a) National Innovation and Commercialization Policy.

Currently there is no national innovation and commercialization policy and strategy. A draft National Science, Technology, and Innovation Policy (2021) emphasized technology transfer and commercialization of R&D outputs, but not all aspects of innovation, start-ups and innovation hubs were covered.

(b) National Innovation/ Commercialization Fund.

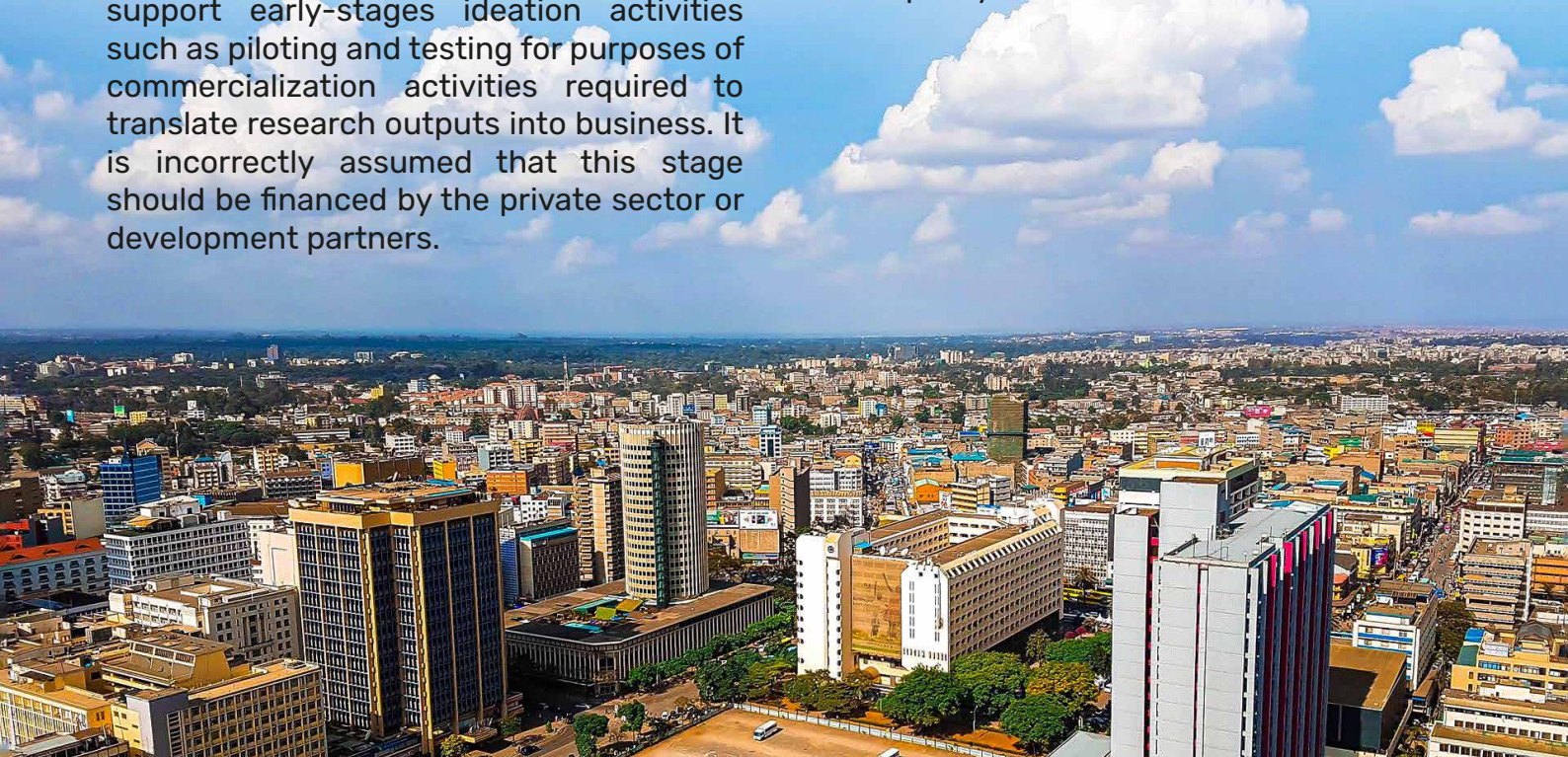
Currently there is no dedicated fund for innovation and commercialization. The STI Act 2013 provides that at least 2% of the GDP should be allocated to R&D, and the funding level is currently at around 0.8%. However, the prevailing funding practice focuses more on funding research than funding technology transfer and commercialization of research outputs. Traditionally, the funders consider research to be completed when new knowledge is generated and the necessary (or promised) outputs such as reports, and publications are realised. The funding structure does not support early-stages ideation activities such as piloting and testing for purposes of commercialization activities required to translate research outputs into business. It is incorrectly assumed that this stage should be financed by the private sector or development partners.

(c) Coordination of the various agencies responsible for innovation and commercialization

Currently there is inadequate coordination of universities, research institutes and government agencies responsible for technology transfer and commercialization. The STI Act (2013) has provided for the establishment of three agencies (NACOSTI, NRF and KeNIA) to spearhead science, technology, and innovation in Kenya. However, these are at early stage of establishment and have not yet built adequate human and financial resources to deliver on their mandates. Furthermore, there is inadequate collaboration of the three with other agencies such as those under ministries of ICT, Industrialization, Trade and Enterprise Development.

(c) National Intellectual Property Policy.

Kenya hasn't operationalized a national Intellectual Property policy, despite being the regional leader in innovation. Several past attempts have been made to develop an IP policy but has remained at draft level.



Institutional Settings

Institutions in this context primarily refer to Universities and Research Centres. A number of challenges affect the technology transfer and commercialization at the institutional level that cumulatively affect the national ability to tap into the huge potential.

(a) National Innovation and Commercialization Policy.

Not all universities and research institutes have Technology Transfer Offices (TTOs). Furthermore, where they exist, most of the TTOs are deemed unable to fully execute on their mandate due to:

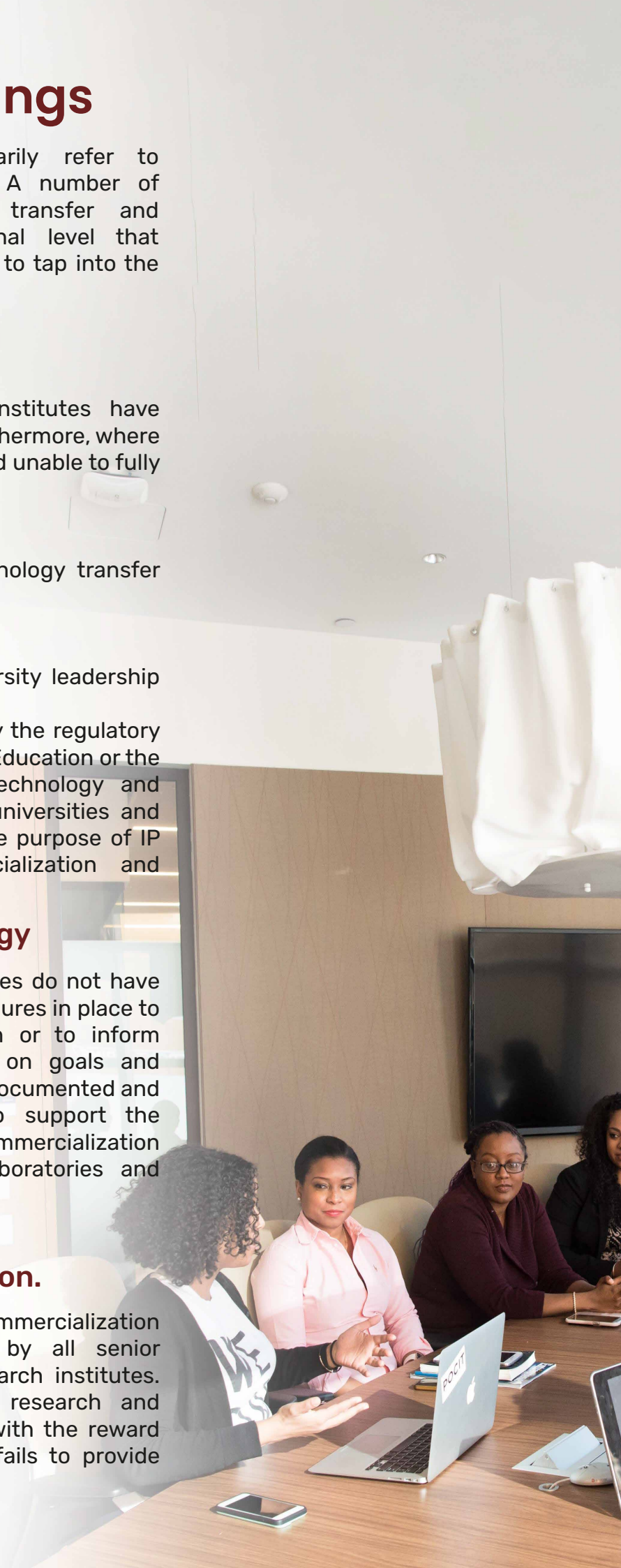
- a. unclear mission and mandate
- b. insufficient skillset and manpower
- c. lack of clear career path for technology transfer managers
- d. low visibility and recognition
- e. low funding
- f. unclear placement within the university leadership structure
- g. lack of clarity on the requirement by the regulatory institutions (Commission of University Education or the National Commission for Science, Technology and Innovation) on the requirements for universities and research institutes have a TTOs for the purpose of IP management, registration, commercialization and accreditation.

(b) Commercialization Strategy

Most universities and research institutes do not have institutional level processes and procedures in place to manage innovation commercialization or to inform researchers and other stakeholders on goals and targets. There is need for internal well documented and socialized strategies and guides to support the institutional wide coordination of commercialization efforts by different departments, laboratories and centres.

(c) Priority of technology transfer and commercialization.

Currently technology transfer and commercialization are not recognized as a priority by all senior management of universities and research institutes. The current focus is primarily on research and publications, which is directly linked with the reward system that awards publication and fails to provide incentives for commercialisation.



Of recent a few universities have begun recognising IP applications and patents for the purpose of promotion, a practice not widespread within academia. Further, current internal research is funded by universities and research institutions, with little or no resources allocated to commercialization. There needs to specific incentives that rewards commercialization. Additionally, this should form part of the staff promotion policy criteria.

(d) Intellectual Property Policies

Some universities and research institutes have intellectual property policies. An IP policy is an important tool for promoting technology transfer and commercialization. Of the few policies in existence, many are not effective, whereby a significant percentage of staff and students have no awareness thereof. There is little evidence that the incentive structure is implemented to the letter even where revenue has been generated. While existing IP policies provides for equity distribution, there are many instances where guidelines are not provided on the establishment of spin-offs/start-ups or the role of the researcher. Clarity on benefit sharing policies will set the benchmark for positive outcomes. Conversion strategy of students' projects into products and business is evidently absent.

(e) Framework for university-industry linkages.

Currently there is systematic framework to strengthen linkage between academia and industry. The weak university-industry linkage is cited as one of the reasons for the low level of technology transfer and commercialization of R&D outputs. This may be because of:

- a. research activities do not meet market demand
- b. industry requirement on commercial potential not realized
- c. absorptive capacity on created innovations absent
- d. weak industrial base and the informal nature of the local industries
- e. lack of tax incentive for industry and potential investors
- f. low level of staff mobility between industry and academia for skills transfer.

Current funds for universities is based on students registered, graduated and research outputs with main focus on publication. Innovation indicators such as granted patents, commercialized, spinoffs created, and technology transferred requires more focus.

(f) Screening of publications for innovations

Most universities and research institutes do not clearly define and enforce how research proposal screening for possible IP emanating from the research should be managed.

This makes it difficult to identify potential IP for protection and commercialization resulting to loss of potential 3rd stream income generation.

(g) Grants for intellectual property rights

Although the number of applications has been steadily increasing, the conversion rate of these applications to actual grants is extremely low.

Individual (Researcher/ Innovator) Realities

Individual researchers and innovators in the institutions do face a set of challenges which affect technology transfer and commercialization at Kenyan universities and research institutions:

(a) Awareness on Intellectual Property

The level of IP awareness and appreciation amongst the research community is low.

(b) IP training and education

Inadequate skills available to promote IP generation, protection, and commercialization. Only a small percentage of researchers are exposed to IP management. Staff and students at large are not aware of the importance of IP rights. Large number of graduates have no knowledge of intellectual property. Supporting skills such as IP valuation, negotiation, technology licensing and incubation, and patent drafting are crucial for the individuals to make informed choices.

(c) Support to researchers on commercialization

There is limited support given to researchers and students on commercialization. Talented researchers are motivated to conduct research, with low or no inclination to commercialization.

Hence, successful commercialization cannot be realized without active involvement of the researcher. Furthermore, researchers lack capacity to package research information in a manner for appropriate absorption. Balancing of time between research, teaching and commercialization is challenging for researchers, given their inexperience at commercialization activities.

(d) Documenting success stories

Due to insufficient documentation of success stories on commercialization and the benefit individuals derived, there is a low level of local benchmarks for motivation. Researchers need to be informed of other researchers who have generated large revenue based on innovation commercialized.



A set of recommendations to strengthen the national commercialization system are provided in the last chapter of this report.



Start Up Ecosystem

Introduction

Kenya is East Africa's leading economy with a GDP of Kes 2.4 trillion as at 2021. There is a huge youthful population, favourable macroeconomic policies, and significant investments in infrastructure.

The Kenya National Bureau of Statistics (KNBS), Kenya's economy is poised for take-off as demonstrated by 2021 estimated record of 10.1% annual growth. However, this rapid expansion of the economy has failed to yield the expected "trickle-down economics" of a growing middle class with quality jobs and quality of life. Why? Because much of this growth is in the informal sector that is characterized as a cash-based economy.

The informal sector is vulnerable to external shocks such as climate change and pandemics. Moreover, the informal sector fails to contribute its fair share to the economy through taxes, and the jobs created fail to provide workers with adequate security such as health insurance and pension funds. Ultimately, this leads to a fragile economy that lacks a definitive roadmap for achieving the Kenya Vision 2030 goal of becoming a middle income.

Start-up Economy and National Development

'Startup economy' is a concept that focuses on the creation of high growth ventures. These ventures are distinct from small medium enterprises (SMEs) in that they launch and operate in the formal sector, depend on technological innovation to create/sustain a competitive edge in the marketplace, and they depend on venture capital to drive rapid growth.

The value that start-ups create in the national and/or subnational economy is transformative in that they attract local and foreign investments, rapidly create jobs for highly skilled and unskilled workers, build local value chains and export goods and services. Moreover, the spill-over effect of very successful start-ups, i.e. "unicorns", defined as ventures valued at over USD 1B is the creation of high net worth (HNIs) categorized in Kenya as individuals whose estates are valued over USD 1M.

These are individuals with the financial ability, know-how and networks to create wealth by mentoring and backing the next generation of HNIs and job creators, thus creating a virtuous cycle of wealth and jobs creation.

As of 1st May, Africa's total VC investment is USD 2 Billion, and is projected to hit \$7 B by the end of this year, making Africa the fastest growing start-up economy in the world.

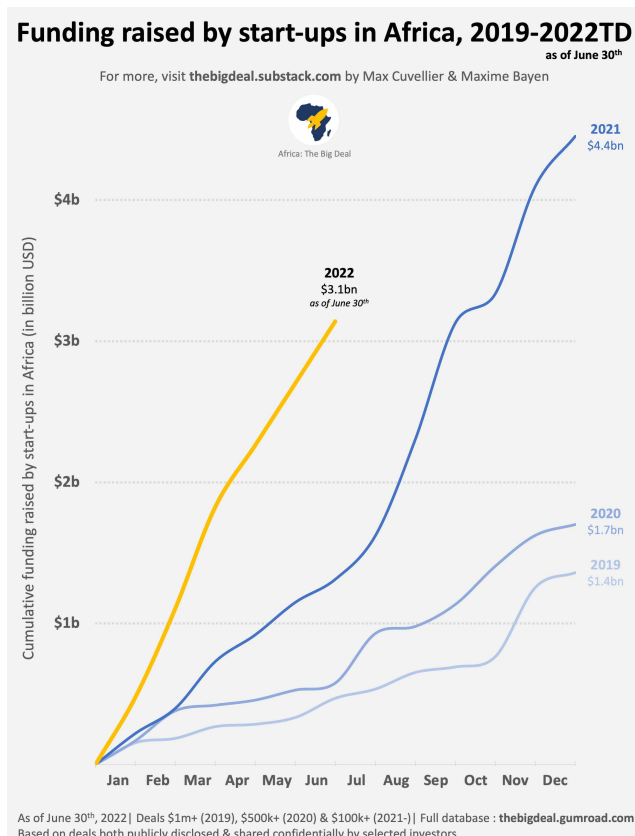
However, this upward trend cannot be maintained without deliberate policy and political good will. For example, funding of Kenyan start-ups by international investors fell from position one (1) in 2020 to fourth last year, following a decline of Sh15 Billion from \$549 Million (Sh62.2 billion) in 2020, to \$411 million (Sh46.5 Billion) in 2022 representing a 25.1% drop.

We believe Kenya's startup economy has what it takes to not only regain the number 1 spot as a destination for VC investment, but to also transform Kenya by creating jobs, contributing to the country's tax base, and lifting the masses out of poverty by creating an employee middle class.

A basic startup ecosystem has about five major drivers that are discussed below:

- a) Academia this comprises of University, TVETS's and Research Centers: These generate human resource as well as seed that is innovations that are developed into startups
- b) Government Agencies: Such as KeNIA. They act as regulator and implement policies governing startup operations
- c) Investors: There are various investors in the ecosystems right from Venture capitalists, angel investors to financial institutions etc. These organizations and individuals provide the necessary funding to support startup growth in the ecosystem
- d) Large corporations/private sector: They provide the market access to absorb new products and services generated through the startups
- e) Accelerator & Incubators: These are the platforms that host and support the growth and development of startups in the ecosystem. Providing them with relevant technical and operational support systems as they get into the market

Start-ups engage and work closely with the support from the incubators and accelerator programs, getting both financial and non-financial support from investors and through the various governing bodies in the national government. These drivers have been fundamental to the growth of the start-ups in Kenya.





Startup Trends

The Global Start-up Ecosystem Index 2021 ranked the start-up ecosystems of 100 countries and 1000 cities. At the global level, Kenya is ranked number 61 and occupies position four in the Middle East and African region behind Israel, UAR and South Africa. Regionally, Kenya is in position 2 behind South Africa.

Start-ups distinguish themselves from large businesses primarily in terms of their size. They are more flexible and innovative, and characterized by flat organizational structure and small founding teams. Start-ups are able to quickly react to changes in the market and technology under remarkably uncertain conditions.

Start-up businesses often start with limited financial investment and the initial capital is raised either by an individual or by the founders of that start-up. In the initial phases the overheads supersede revenue as start-up start-ups develop, test and market the product/service.

A study by UNDP Kenya that mapped 232 start-ups in the country found that most of the innovations in the country are domiciled in the capital city, Nairobi, skewing those in the rural areas and other cities.

Again, most of the founders in these start-ups are relatively young with about 50% of the innovators less than 35 years of age. The study also indicated that a majority of the start-ups (74%) are formally registered unlike the MSEs sector, which is dominated by informality. In terms of ownership, about 40% of the start-ups surveyed were sole proprietorships, indicating that partnerships, corporations, and limited liability companies are yet to gain traction as a business model for start-up formation.

A majority of the start-ups in Kenya are relatively young. Almost 63% of the start-ups surveyed in the UNDP study indicated that they were less than 3 years old, a significant statistic given that up to 80 % of new companies in Kenya do not celebrate their third birthday.

Type of Innovations generated by start-ups

The bulk of innovations generated by start-ups are all-in-one (hardware, software, and process). The innovations applied in a number of sectors of the economy ranging from agriculture, health, water and education are mostly e-commerce innovations. All the e-commerce innovations are ICT driven which corresponds to the increasing prominence given to the digital economy in the country.

Technical capacity and markets of the start-ups

In terms of skills of the employees, the UNDP supported study found out of that out of the surveyed 225 start-ups, 85% of the start-ups considered the level of the skills of their staff as inadequate.

Areas of improvements and skill required by the employees of the start-ups are:

- (i) marketing
- (ii) legal and intellectual property
- (iii) business development
- (iv) database management.

While marketing support is required as well, the study noted access to markets is a challenge for start-ups. The top target market for the start-ups/innovators are individuals, companies, and government. There is a need for more targeting of the regional market as well as international markets for the start-ups.



Funding for Start-ups

Nairobi is ranked as the second-best start-up ecosystem in Africa after Lagos Nigeria. Since 2016, Kenya has made a steady growth attracting funds, rising from USD 10.5 million in 2016 to USD 375 million in 2021. This amount of funding was however raised by relatively “few” ventures - with 59 Kenyan start-ups responsible for the investment in 2020, up from 45 in 2019, 37 in 2018 and 24 in 2017.

Kenya ranked fourth in terms of the number of funded companies - with Nigeria, Egypt and South Africa all boasting more funded start-ups, albeit to a (substantially) lesser cash total (AfricanTech Start-ups Funding Report 2021). Nigeria leads the pack in terms of money raised by start-ups and the number of start-ups supported, followed by Egypt and South Africa.

The top ten Kenyan start-ups in terms of volume of money raised are M-Kopa, Twiga Foods, Copia Global, AZA Finance, Sendy, Lendable, Little Cab, African Talking, PayGo, and Gro Intelligence. Between them they raised around USD 550 million during the period 2008-2021.

A UNDP supported study, mapping the start-up ecosystem funding established that the five topmost funded sectors were AI (29%), AgriTech (23%), Fintech (21%), Energy (10.7 %) and E-commerce. The ownership of the successful start-ups showed a mix of those that had at least a female founder (32%), those with at least a local founder (72%) and those that had at least an international founder (43%). Below is a table of data compiled from crunch base for startup funding for the past one year;

Company Name	Funding amount (approx. 1 year from date of report)	Funding Round	Major investor (Nationality, Lead)
Lendable	None	None	FMO (Netherland, Lead)
Wasoko	\$120M	Series B	Avenir Growth Capital (USA, Lead)
Copia Global	\$50M	Series C	Koa Labs (USA, non-lead)
Twiga Foods	\$50M	Series C	Creadev (France, Lead)
Cellulant	None	None	The Rise Fund (USA, Lead)
Apollo Agriculture	\$50.5M	Series B, Debt financing	Softbank Vision Fund (UK, Lead)
Market Force	\$42.3M	Seed round, Series A	V8 Capital Partners (Mauritius, Lead)
Poa Internet	\$28M	Series C	Africa 50 (Morocco, Lead)
Komaza	\$10M	Debt financing	FMO (Netherland, Lead) AXA Investment Managers (France, Lead)
Mara	\$23M	Seed round	Distributed Global (USA, Lead)
Sendy	None	None	Atlantica Ventures (Nigeria, Lead)

Spread and Inclusivity

(counties, local vs international founders etc)

Current studies show that other counties such as Taita Taveta, Mombasa Kiambu and Kisumu have presence of startup operations, an indication that startups have been expanding to other countries from the Nairobi city county, including rural areas.

Sectors & Numbers

According to crunch base, the table below shows the top 10 startups by sectors and it further indicates the impact the startups have created in the economy through creation of jobs.

Company Name	Funding amount (approx. 1 year from date of report)	Sectors	No. of employees*
Lendable	2014	Financial Services, Fintech	1-10
Wasoko	2013	Consumer Goods, Logistics	1001-5000
Copia Global	2012	Consumer Goods, Delivery, E-Commerce	251-500
Twiga Foods	2013	Agriculture, E-commerce, Grocery	501-1000
Cellulant	2004	Financial Services, Payment	251-500
Apollo Agriculture	2016	Agriculture	251-500
Market Force	2018	Information Technology	251-500
Poa Internet	2015	Internet	51-100
Komaza	2006	Forestry	251-500
Mara	2021	Financial Services	11-50
Sendy	2014	Apps, B2B, Delivery	101-250

Summary of MSMEs/ Startups / Business Policies and Regulations in Kenya

There are several policy instruments guiding the startup ecosystem in the country. Below is a listing of the critical ones.

General Regulations		
Business setup <ul style="list-style-type: none">-Companies Act of 2015-Limited Liability Partnership Act-Limited Partnerships Act-Partnership Act-Non-governmental Organization Coordination Act-Data Protection Act	Tax <ul style="list-style-type: none">-Tax Procedure Act-Income Tax Act-Value Added Tax Act	Intellectual Property <ul style="list-style-type: none">-Copyright Act of 2011-Industrial Property Act-Trade Marks Act
Subject Matter Regulations		
Incubation <ul style="list-style-type: none">-Central Bank of Kenya Act-National Payment Systems Act-Retail Transfer Regulations-Capital Markets ActInsurance Act	Incubation <ul style="list-style-type: none">-Kenya Information and Communications Act	Intellectual Property <ul style="list-style-type: none">-Data Protection Act
The Startup Bill, 2021		
Incubation <ul style="list-style-type: none">-Incubation support to be at the County level-Incubation programmes to be certified	Incubation <ul style="list-style-type: none">-Startups to be registered-Only registered startups shall be allowed to participate in incubation programmes	Intellectual Property <ul style="list-style-type: none">-Subsidized formalization of startups-Facilitation of IP protection-Credit guarantees

As much as there is still a long way to go, commendable strides have been made that should allow for reasonable enhancement of the ecosystem. The biggest challenges about policy will be in implementation and follow through / enforcement.



**Examples of Start-ups
in Kenya and funding
attracted.**

Start Up

Overview

Last Round

Total Raised



Founded
2009

Sun King designs, distributes, and finances Sun King solar home energy solutions to households and businesses who lack reliable access to the grid.

Series D

\$506,000,000.00

TALA

Founded
2011

Tala is a financial technology company on a mission to build a financial system that works for everyone.

Series E

\$349,439,700.00

Glovo

Founded
2015

Glovo is a courier service that purchases, picks up, and delivers products ordered through its mobile application.

Series F

\$336,000,000.00



Founded
2007

D.light is an international Energy startup that serves people without access to reliable electricity.

Debt Financing

\$266,500,000.00

M-KOPA

Founded
2011

M-KOPA has connected more than 500,000 homes in Kenya, Tanzania and Uganda to solar power, with over 500 new homes being added every day.

Private
Equity

\$237,100,000.00



Founded
2013

Twiga Foods is a business-to-business marketplace platform that sources produce directly from farmers and delivers it to urban retailers.

Series C

\$145,650,000.00

WASOKO

Founded
2013

Wasoko (formerly Sokowatch) is transforming communities across Africa by revolutionizing access to essential goods and services.

Series B

\$143,600,000.00

Start Up**Overview****Last Round****Total Raised**

Founded
2014

Gro Intelligence is an AI-powered insights company that provides decision-making analytics to the agriculture economies and their participants.

Series B

\$118,810,000.00



Founded
2012

Copia Global provides a consumer catalog order and delivery system intended to serve consumers in the developing world.

Series C

\$103,000,000.00



Founded
2013

CSquared builds metro fiber and Wi-Fi networks to help local providers connect more people to the Internet and each other

Venture

\$100,000,000.00



CROSSBOUNDARY
ADVISORY

Founded
2011

Cross Boundary is a mission driven investment firm that unlocks the power of capital for sustainable growth and strong returns in underserved markets.

Private
Equity

\$100,000,000.00



Founded
2008

Sama provides high-quality training data that powers AI technology.

Series B

\$84,800,000.00



Founded
2012

Sun Funder is unlocking debt capital for solar energy access & climate change.

Grant

\$81,320,000.00



Founded
2013

Aza Finance is enabling businesses to grow past their borders through safe and affordable FX and cross-border money transfer solutions.

Debt Financing

\$64,950,000.00

Start Up**Overview****Last Round****Total Raised**

Founded
2004

Cellulant is a leading multinational payments company in Africa on a mission to digitize payments for Africa's largest economies.

Series C

\$54,500,000.00



Founded
1956

Britam is a diversified financial services group.

Post-IPO Equity

\$53,640,790.00



Founded
2016

Apollo Agriculture is a technology company based in Nairobi, Kenya that helps small-scale farmers maximize their profits.

Series B

\$52,200,000.00



Founded
1982

Shelter Afrique is the only Pan-African Finance Institution.

Private
Equity

\$50,000,000.00



Founded
2006

Komaza is making smallholder farmers the future of African forestry.

Debt Financing

\$47,900,000.00



Founded
2016

Lori has built a logiST&Ics platform that is revolutionising the cargo-transport value chain in Africa – from the ground up.

Series B

\$44,450,000.00

Challenges and Opportunities in the Startup Ecosystem

Below are some of the challenges and opportunities that were captured during the field work while preparing this report.

Access to Financing

This is especially so for early-stage startups generally considered riskier by investors. Mismatch between startups and available financiers attributed to among others, lack of information by startups, specialization by funders on specific startup stages etc. Limited resources by financiers that makes the financing space extremely competitive and thus very difficult for startups.

Government support

Perceived insufficient despite commendable efforts at County and National level to raise the profile of the startups sector through among others, supporting regulations. Both startups and stakeholders are of the opinion that the government does not sufficiently support startups – which experts attributed to policies that bundle startups along with other businesses / MSMEs.

Growth in venture capital

There has been the emergence of locally owned sector financiers / funds that target startups such as Cellulant, Build Grow, and Early Bird which has allowed increasing vertical integration. For example, Victoria Ventures, Nairobi Business Angels Network, Pangea, and GIZ are providing matching funds and business advisory services.

Tech Focus

There is a tendency for stakeholders to lean more towards startups with a tech component. This survey revealed that not all businesses with real potential to scale are tech based, that is, it is not just about Apps. There is significant risk of losing out on potential unicorns that require the meticulous support that is usually extended to tech (app) based solutions.

Low Commercialization

Academia plays a key role in translating research to commercially viable ventures. It is worth noting that the commercialization of research still has lots of gaps locally.

Distribution of support services

Despite the rapid growth of the Kenyan startup ecosystem, there is disparity in the distribution of the benefits of the startup access to innovation hubs, learning institutions, Internet services, mobile networks, and grid electricity than city dwellers. In addition, access to computers and laptops in the country between rural and urban centres as well as across gender (in favor of men).

Capacity of coordinating institutions

Although there is adequate coordination and governance structures for the Kenyan innovation ecosystem, their capacities to provide effective support to the ecosystem is currently limited by human and financial resources, laws, tax incentives, policies. Furthermore, coordination amongst the key agencies and there is currently no registration process for startups.

Age and Gender

The Kenyan innovation ecosystem is driven by youthful and well-educated innovators and entrepreneurs. This bodes well for the sector. However, in terms of gender distribution, only 22% of the start-ups being women-originated or led.

Sectors

Most of the innovations are linked to prioritized sectors of the Kenya economy, namely e-commerce, agriculture, energy, health, education, water and finance. However, there are few innovations addressing sectors such as manufacturing and housing.

Intellectual Property

Protection of innovations through intellectual property rights remains a challenge for most of the start-ups. The main reasons cited for this are: lack of proper information on intellectual property, lengthy and time-consuming patent application process, high cost of patent applications and maintenance, and infringement due to weak enforcement.

Business Management Skills

Most of the start-ups do not have adequate skills to effectively manage their businesses. The top-most-rated skills required by the employees of the start-ups are marketing, legal and intellectual property, business development, and database management.



22%

Of the start-ups are women-originated or led

Collaboration

There is evidence of collaboration of the hubs with other government agencies and that such collaborations bring benefits to the hubs. However, the level of collaboration is inadequate. Furthermore, there is little evidence of collaboration not only between the hubs themselves but also with other business entities.

Investor Attractiveness

Kenya is increasingly becoming an attractive destination for investors in start-ups. During the last five years (2017-2021), the amount of money raised by Kenyan start-ups has increased from USD 40 million to USD 385 million while the number of start-ups attracting funds increased from 40 to 86.

Innovation Hub domination

The Kenyan innovation hubs segment is dominated by the public entities and the NGO sector (70% of the hubs), while the private sector accounts for only 30%. However, increased involvement of the private sector is required for long term sustainability.





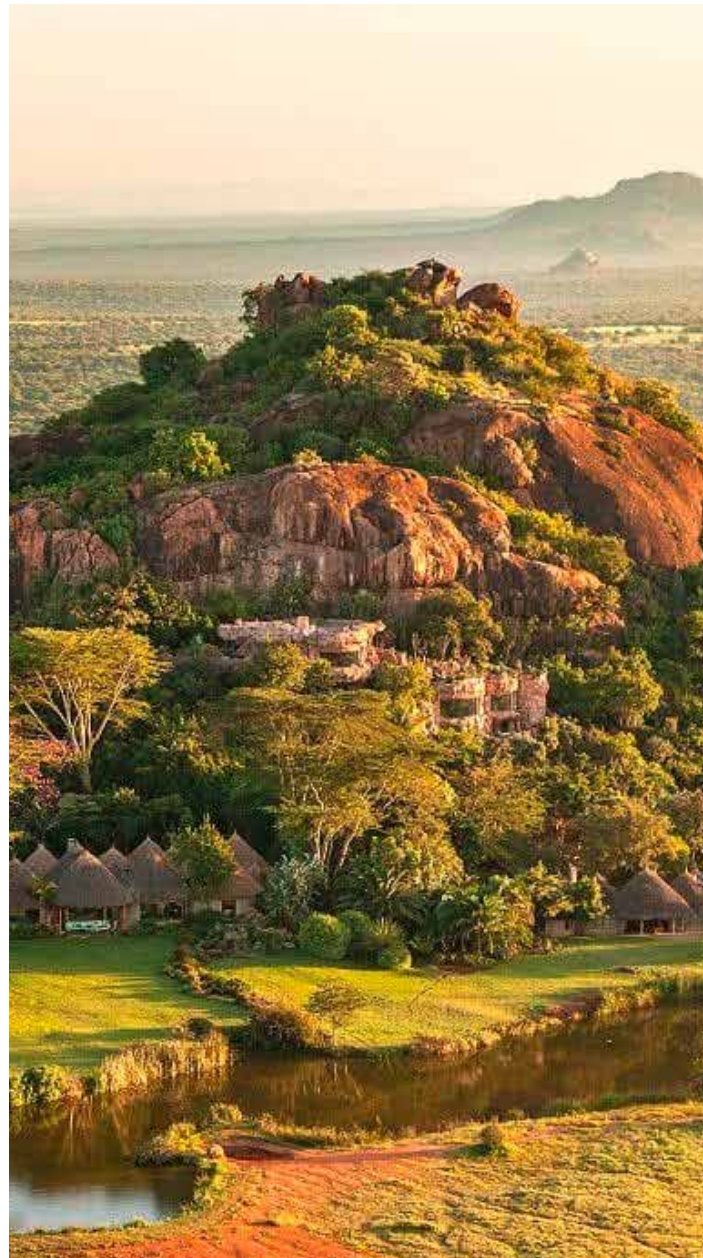
Examples of players in the Start-Up Ecosystem

Laikipia Innovation and Enterprise Development Program (LIDP)

Laikipia county is hailed for its deliberate effort to support innovations that can be classed as start up in manufacturing technologies. Viewing manufacturing as “the silver bullet for Kenya to join the big league”, the county initiated the The Laikipia Innovation and Enterprise Development Program (LIDP), in May 2018. The establishment of the LIDP program was inspired when the county government recognized innovation in manufacturing as a critical enabler for job creation among the youth and entrepreneurs. Specifically, the LIDP was to encourage residents of the county to become creative in generating impactful technological advancements, especially in manufacturing for industrialization. LIDP draws synergy players in the innovation space including Dedan Kimathi University, private entities like commercial banks and non-governmental organizations.

Achievements from the LIDP

- 156 Laikipia products certified
- 322 MSMEs provided with working space
- Promoted 724 Laikipia products to local & international markets
- 46 groups and 5 individuals funded to a tune kshs 12,010,000 under Enterprise Fund
- Funded 307 Laikipia Business to the tune of kshs. 142,820,000 under ESP
- 264 business plans developed
- Trained 64 Business Development officers on the rebate program
- Sensitization of Laikipia Manufacturers on power and business licence rebate on-going.



Konza Technopolis

konza.go.ke

Konza Technopolis is one of the key flagship projects of Kenya's Vision 2030 and is a key economic driver of the Kenyan economy. Konza is envisioned to create a world-class smart city and area of innovation and be a global technology and innovation hub.

Konza Technopolis as a smart city and a science and technology park act as a hub for technology, innovation, and incubation for small-medium start-ups which it implements through strong linkages and partnerships with its stakeholders in the innovation ecosystem.

The implementation of Konza is driven by three clusters; Life Sciences, Engineering, and ICT/ITES.



M-Pesa

safaricom.co.ke/personal/m-pesa

M-PESA is Africa's most successful mobile money service and the region's largest fintech platform. It also provides financial services to millions of people who have mobile phones, but do not have bank accounts, or only have limited access to banking services.

Now, M-PESA provides more than 51 million customers across seven countries in Africa with a safe, secure and affordable way to send and receive money, top-up airtime, make bill payments, receive salaries, get short-term loans and much more.

Established on 6th March 2007 by Vodafone's Kenyan associate, Safaricom, M-PESA is Africa's leading mobile money service with more than 604,000 active agents operating across the Democratic Republic of Congo (DRC), Egypt, Ghana, Kenya, Lesotho, Mozambique and Tanzania.





KenTrade kentrade.go.ke

Kenya Trade Network Agency (KenTrade) is a state Agency under the National Treasury that is mandated to facilitate cross border trade and establish, manage and implement the National Electronic Single Window System (Kenya TradeNet System).

The system developed Integrates electronic systems of public and private entities involved in receipting, processing and approving documents relating to international trade transactions.

They also maintain an electronic database of all imported and exported goods and services and the levies, fees, duties and taxes charged on imported or exported goods and services.

Huduma Kenya hudumakenya.go.ke

Huduma Kenya Programme is a Government of Kenya initiative whose aim is to turn around public service delivery by providing efficient and accessible Government services at the convenience of citizens through various integrated service delivery platforms.

They have developed 6 channels of service delivery; Huduma centers, Huduma Life App, E & M Huduma, Huduma contact center, Huduma Mashinani & Huduma card.





Association of Startup and SMEs Enablers of Kenya (ASSEK)

assek.ke

The Association of Start-up and SMEs Enablers of Kenya (ASSEK) is an association that brings together and represent the interests of organizations supporting the development and growth of start-ups and SMEs for maximum impact of such activities.

In fostering the startup and SMEs enablers ecosystem in Kenya, ASSEK is to play a key role, specifically, the association representative all the actors of the Kenyan startup and SMEs enablers ecosystem and actively promotes the networking among its members that are spread-out across the country, and the driving force for an entrepreneurial economic breakthrough of Kenya.

Association of Countrywide Innovations Hubs (ACIH)

hudumakenya.go.ke

Countywide Innovation Hubs is an association of hubs located outside Nairobi. The main objective is to promote activities and programs of the member hubs and supporting their vision of testing and building impactful sustainable businesses in rural and second tire towns of Kenya.



ASSOCIATION OF COUNTRYWIDE
INNOVATION HUBS



A close-up photograph of a robotic arm assembly. The main focus is a black motor with a fan-like vent on its side, mounted on a metal frame. Below the motor are several blue rollers. The background is blurred, showing other parts of the machine and a QR code on a white label. The lighting is dramatic, with strong highlights and deep shadows.

Section Three

Recommendations and way forward

Introduction

Kenya's national innovation system is relatively young but has generated significant outcomes. Besides a well facilitated National Innovation Agency, stronger coordination has stood out as the most crucial intervention needed over the next several years.

Among specific recommendations that would shape the next phase of the national innovation system include:

Overview of the Recommendations

10-year Master Plan/Roadmap

A longer-term national innovation masterplan would support the directing and consolidation of national efforts towards clearly set out goals and targets. Such a consolidated roadmap with well-identified priorities, over a specified time would aid achievement of maximum results and impact. The masterplan would strengthen cross-sectoral collaboration, alignment to Vision 2030, the SDGs, and AU's Agenda 2063 while minimizing duplication of efforts and underutilization of established infrastructure and recourses.

Development of National Intellectual Policy and Innovation Policy

The comprehensiveness and operationalization of the national IP policy is very crucial in the coordination of the national innovation system. The Kenya Industrial Property Institute (KIPI), working with other ST&I Agencies and corresponding ministries have the obligation to coordinate this crucial process to completion. A fully operationalized policy would unlock multiple efforts by numerous institutions. Innovation policies and strategies will build on a strong and effective IP policy.

More proactive coordination of the national innovation system

There are numerous efforts, programs and facilities across government, private sector and within the development circles. The National Innovation Agency - KeNIA has been formally established and is expected to progress with the development, management, coordination, and promotion of the national innovation system. The Agency, well enabled and supported, holds key to the country's ability to maximize on the various investments on the national innovation system.

Development of a National Commercialization Policy / Strategy

It is recommended that a National Commercialization Policy/Strategy with significant attention to universities, research institutions and TVETs needs to be developed to provide guidance and strategic direction. The strategy would need to provide for a strong and systematic framework to enhance collaboration between industry and academia. KeNIA has a crucial role to play in this strategy development. The strategy would also need to involve other agencies such as the Commission for University Education and the National Commission for Science and Technology, who would support in the review of guidelines for universities on matters of inclusion of Technology Transfer Offices and IP policies.

Coordination of innovation hubs, incubation centres and youth centres

There is need for standardization and decentralization of innovation and incubation centers to enhance easy access of quality services across the country. KeNIA will have to provide leadership in the operationalization of a coordination framework, to enhance the visibility and collective impact as well as support of innovation hubs and centres. Support mechanisms to hubs would include recognition, classification and capacity building.

Further, its vital to capture and nationally aggregate innovations from hubs and similar organizations.

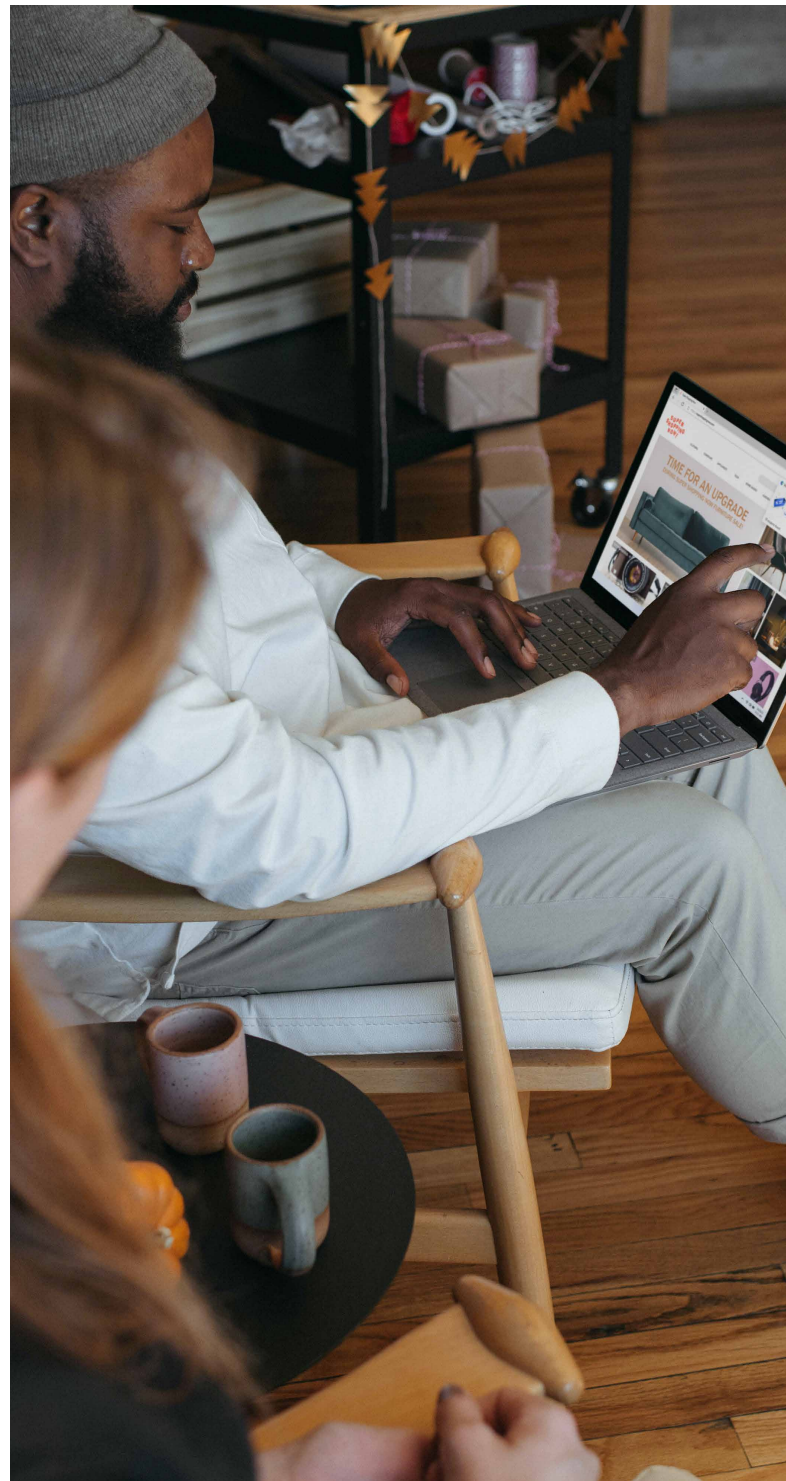
National Innovation Fund

There is need for a National Innovation Fund that would enable funding of establishment (or enhancement) of innovation and incubation hubs, structured funding of promising commercializable research outputs, and innovations that could grow into enterprises. Providing resources to promising startups and enterprises. The funding instruments should provide a mechanism for participation by foundations, philanthropists, and private sector as a way of minimizing risks associated with early

phases of startups. Private sector involvement would strengthen prospects for scaling of the start-ups. This recommendation does include strengthening the venture capital industry.

Incentives to promote innovation

Policy environments can restrict or inhibit the flexibility and potential of some startups. For this reason, there is a need for more sector specific regulatory sandboxes to provide room for innovation. Providing incentives for research and innovation or for acquisition of equipment and machinery a



Empowerment of the Kenya National Innovation Agency.

For the prosperity of the county, and optimization of the innovation focused resources in place, a strong national innovation agency is critical. The world bank provides a framework of seven building blocks of a successful innovation agency that are a very good reference point for Kenya's innovation agency. The seven building blocks are provided below :

1. A clear mission with flexibility to accommodate an emerging economy's changing needs and priorities.
2. Capable staff and strong management practices are key to building trust among prospective beneficiaries and improve an agency's effectiveness in working with entrepreneurs, firms, investors, partners, and donors.
3. Effective governance and management structures help agency staff make decisions without political interference.
4. Diagnostic-based interventions to respond to the evolving needs of an emerging economy particularly on commercialization.
5. Robust monitoring and evaluation (M&E) systems are essential to inform decisions to continue, modify or sunset programs based on their progress and impact.
6. Diversified funding helps ensure the sustainability of financing. Without sustainable funding, innovation agencies face operational difficulties.
7. Strategic partnerships and networks enable the connection between innovation agencies, knowledge, financial resources and other specialized capabilities.



Bibliography



Bahrami, H. & Evans, S. (1995). *Flexible Re-cycling and high-Technology Entrepreneurship*. *California Management Review*, Vol. 37 No. 3, pp. 62-89.

FCDO (2022). *Understanding the Kenyan Startup Ecosystem: A Report on the survey findings of startups and start up Ecosystem stakeholders in Kenya*

Karitu, B., Wangondu, W. & Muathe, S. (2022). *A theoretical route towards conceptualization of startups in emerging markets*. *International Journal of Research in Business and Social Science*. Vol.11. No.4. Pp. 2147-4478

Kenya Gazette Supplement No. 163, *Startup Bill (2020)*, Senate Bills No. 16, Nairobi, Kenya.

Kotsch, C. (2017). *Which Factors Determine the Success or Failure of Startup Companies?*, Munich, GRIN Verlag, <https://www.grin.com/document/372343>

Lawyers Hub, (2020). *Policy Priorities for Startups in Kenya; a report by the Lawyers Hub in partnership with the National Assembly Office of the Leader of Majority and The Kenya National Innovation Agency (KENIA)* .

Muathe, S., Sang, P., Kosimbei, G., Letema, S., Nyachae, S., Kiriago, S., Chelule, K., Ouko, E., Mutua, M., & Maina, S., (2022). *Understanding Startups Ecosystem in Kenya: Drivers, Challenges, and Opportunities*. *Journal of Business and Management Sciences*. Vol.10 NO. 3. pp. 138-146

Ndemo, B., & Weiss, T. (2016) *Digital Kenya: An Entrepreneurial Revolution in the Making*. *Palgrave Studies of Entrepreneurship in Africa*

Nzomo, V., Mwangi, J., Matu-Mureithi, L., Muchiri, C. W., & Rutenberg, I. (2020). *Drivers and modalities of collaborative innovation among Nairobi's mobile tech startups*. *The African Journal of Information and Communication (AJIC)*, 26, 1-24. <https://doi.org/10.23962/10539/30359>

Republic of Kenya. (2012). *Micro and Small Enterprises Act, No. 55 of 2012*.

<https://www.in-dustrialization.go.ke/index.php/policies/99-micro-and-small-enterprises-act-2012>

Robehmed, N. (2013, December 16). *What is a startup?* *Forbes*,

<https://www.forbes.com/sites/natalierobehmed/2013/12/16/what-is-a-startup/#3d176f424c63>

UNDP (2022). *Mapping of the Kenyan Innovation Ecosystem Report*

AUDA-NEPAD (2019). *African Innovation Outlook III | African Union*.

Ayisi, J., Ndakala, F., Nyanga, R., Daniels, C., Owuor, R., Ting, B., and Wanyaman, B. (2019). *Assessing the Potential for Transformative Innovation Policy in Kenya*. 16.

F. Nda *African Higher Education Leadership in Advancing and Inclusive Innovation for Development (2018)*. *Analysis of the National Innovation System in Kenya*.

FCDO, (2020). *Understanding knowledge systems and what works to promote science technology and innovation in Kenya, Tanzania and Rwanda*. OJEU Publication Reference Number:2017/S184377250.

https://assets.publishing.service.gov.uk/media/5fca247fd3bf7f5d09db26ab/KSI_Report_FINAL_.pdf

GoK, (2012). *The Kenya National Innovation Survey Report*. Government Printer, Nairobi Kenya
Hall, A., Rasheed Sulaiman, V., Clark, N., Yoganand, B., 2003. From measuring impact to learning institutional lessons: an innovation systems perspective on improving the management of international agricultural research. *Agricultural Systems* 78, 213–241. [https://doi.org/10.1016/S0308-521X\(03\)00127-6](https://doi.org/10.1016/S0308-521X(03)00127-6)

Hall, B.H., 2020. *Patents, innovation and development*, National Bureau of Economic Research. doi:10.1017/CBO9781107415324.004

Kenya National Innovation Agency (2018). *Strategic Plan 2018-2022*.

Kruss, G., Gastrow, M., 2017. Universities and innovation in informal settings: Evidence from case studies in South Africa. *Science and Public Policy* 44, 26–36. <https://doi.org/10.1093/scipol/scw009>

Leach, M., Rockström, J., Raskin, P., Scoones, I., Stirling, A.C., Smith, A., Thompson, J., Millstone, E., Ely, A., Arond, E., Folke, C., Olsson, P., 2012. Transforming Innovation for Sustainability. *Ecology and Society* 17. <https://doi.org/10.5751/ES-04933-170211>

Ministry of Higher Education, Science and Technology (MoHEST) (2014). *Kenya - Innovation Survey 2012*.

Ndakala, F. (2017). *Kenya National Innovation Indicators Survey 2015*.

OECD/Eurostat (2018), *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities*, OECD Publishing, Paris/Eurostat, Luxembourg. <https://doi.org/10.1787/9789264304604-en>

Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition | en | OECD: <https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm> (accessed Jan. 28, 2022).

World Intellectual Property Organization (2021). *The world's most innovative countries*.

World Bank (2020). *Economy Profile Kenya. Doing business 2020*.

Divakaran, S., McGinnis, P., & Schneider, S. (2018). Survey of the Kenyan Private Equity and Venture Capital Landscape. In *Survey of the Kenyan Private Equity and Venture Capital Landscape (Issue October)*. <https://doi.org/10.1596/1813-9450-8598>

Fosci, M., Loffreda, L., Velten, L., & Rob, J. (2019). *Research capacity strengthening in Low- and Middle-Income countries*.

Kenya National Bureau of Statistics. (2020). *Foreign Investment Survey 2020 Report*.

Kenya National Bureau of Statistics. (2021). *Economic Survey Report 2021*. In *Economic Survey 2021*. <https://www.knbs.or.ke/?wpdmpro=economic-survey-2020>

Lall, S. (1992). Technological capabilities and industrialization. *World Development*, 20(2), 165–186.

Musamali, R., & Ngugi, R. (2019). *County business environment for Micro and Small Enterprises in Kenya (Issue 27)*. Kenya Institute for Public Policy Research and Analysis.

<https://repository.kippra.or.ke/bitstream/handle/123456789/2080/county-business-environment-for-micro-and-small-enterprises-in-kenya-sp27.pdf?sequence=1&isAllowed=y>

<https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-top-trends-in-tech>

<https://www.orfonline.org/research/indias-innovation-ecosystem-mapping-the-trends/>

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