KENYA INNOVATION OUTLOOK STUDY

2022

METHODOLOGY

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4.1 FRAMEWORK FOR EVALUATING THE KENYA INNOVATION OUTLOOK 2022

The national innovation system is complex. For evaluation purposes, this can be better understood through a framework as shown in Fig 6, that systematically unpacks the relevant domains, sub-domains, and activities in the innovation process. Drawing from the definitions of innovation and a national innovation system, previous assessments, and discussions with stakeholders, a context-appropriate framework that describes Kenya's NIS was developed to guide data collection, analysis, and presentation. This framework can be improved in subsequent outlook studies based on emerging knowledge. At the core of the framework are six interlinked domains that define the innovation system and several sub-domains. These sub-domains are used to understand the context within which innovation takes place and identify the relevant indicators. The domains and subdomains are presented in Figure 5 and their interactions are depicted in Figure 6.
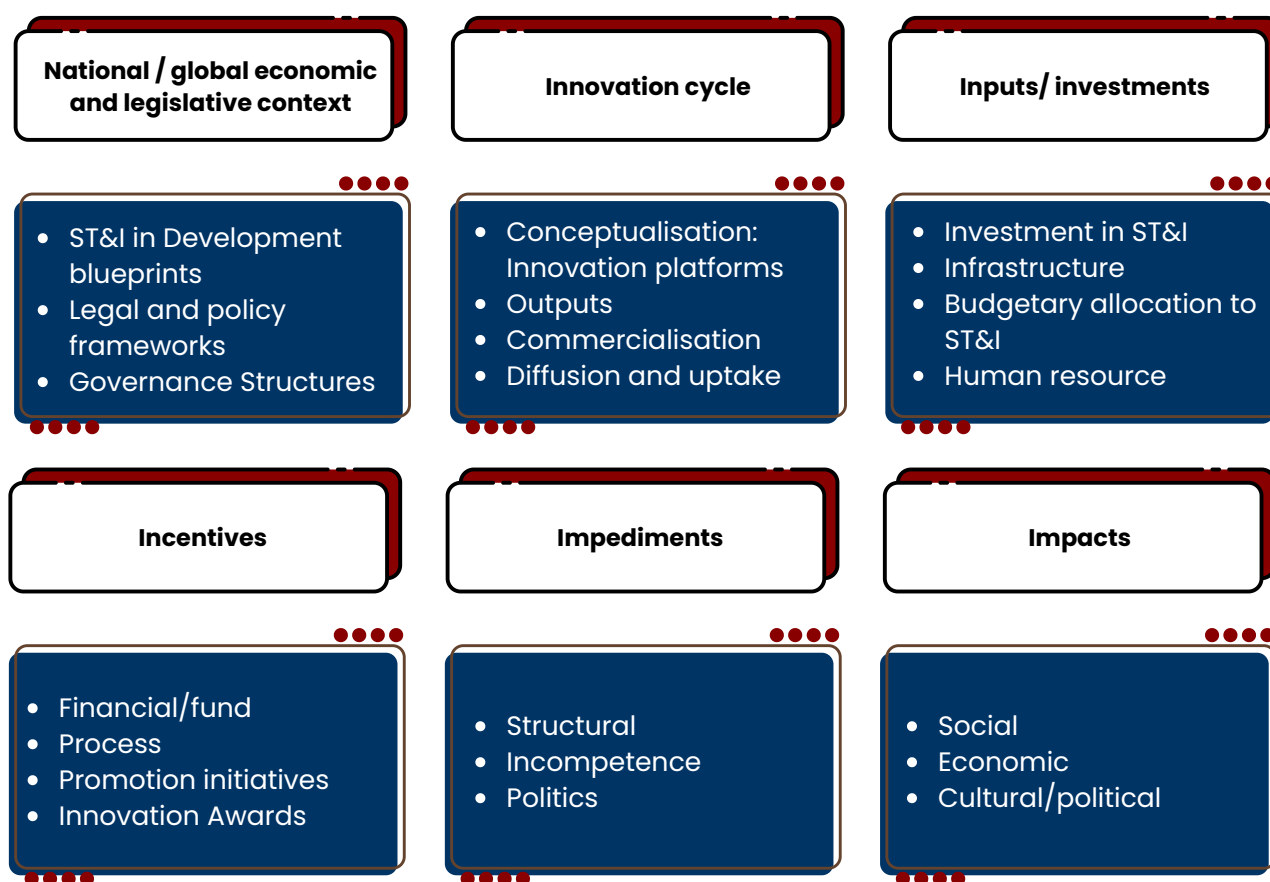
National / global economic and legislative context

- ST&I in Development blueprints
- Legal and policy frameworks
- Governance Structures

Innovation cycle

- Conceptualisation: Innovation platforms
- Outputs
- Commercialisation
- Diffusion and uptake

Inputs/ investments

- Investment in ST&I
- Infrastructure
- Budgetary allocation to ST&I
- Human resource

Incentives

- Financial/fund
- Process
- Promotion initiatives
- Innovation Awards

Impediments

- Structural
- Incompetence
- Politics

Impacts

- Social
- Economic
- Cultural/political

Figure 5: Domains and subdomains for the KIO 2022 Framework

Domain 1, National and Global legislative and Economic Context: involves the context within which innovation happens. 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.

Domain 2, Innovation life cycle/value chain: is about the 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. The outputs (test products, new processes, and knowledge) from these platforms may be consumed internally by the producers or be taken up for further development and scaling up in commercialization platforms including innovation incubators, special economic zones, and private companies. At the state level, the innovation cycle is sustained through inputs such as budgetary allocation for ST&I, development of specific infrastructure (such as putting up research facilities and laying internet connections), and investments in education.

Domain 3, 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. Infrastructure on the other hand is a key enabler for innovation. There is various infrastructural support such as a knowledge infrastructure. For purposes of this outlook, we identify digitalization and access to electricity as some of the key drivers and enablers of innovation activities.

Domain 4, Incentives: involves 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.

Domain 5, Impediments: involves factors that prevent the progression of innovations through the value chain to commercialization and scaling up including 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.

Domain 6, Impacts: which constitute the impacts of innovations. Any investments in 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.
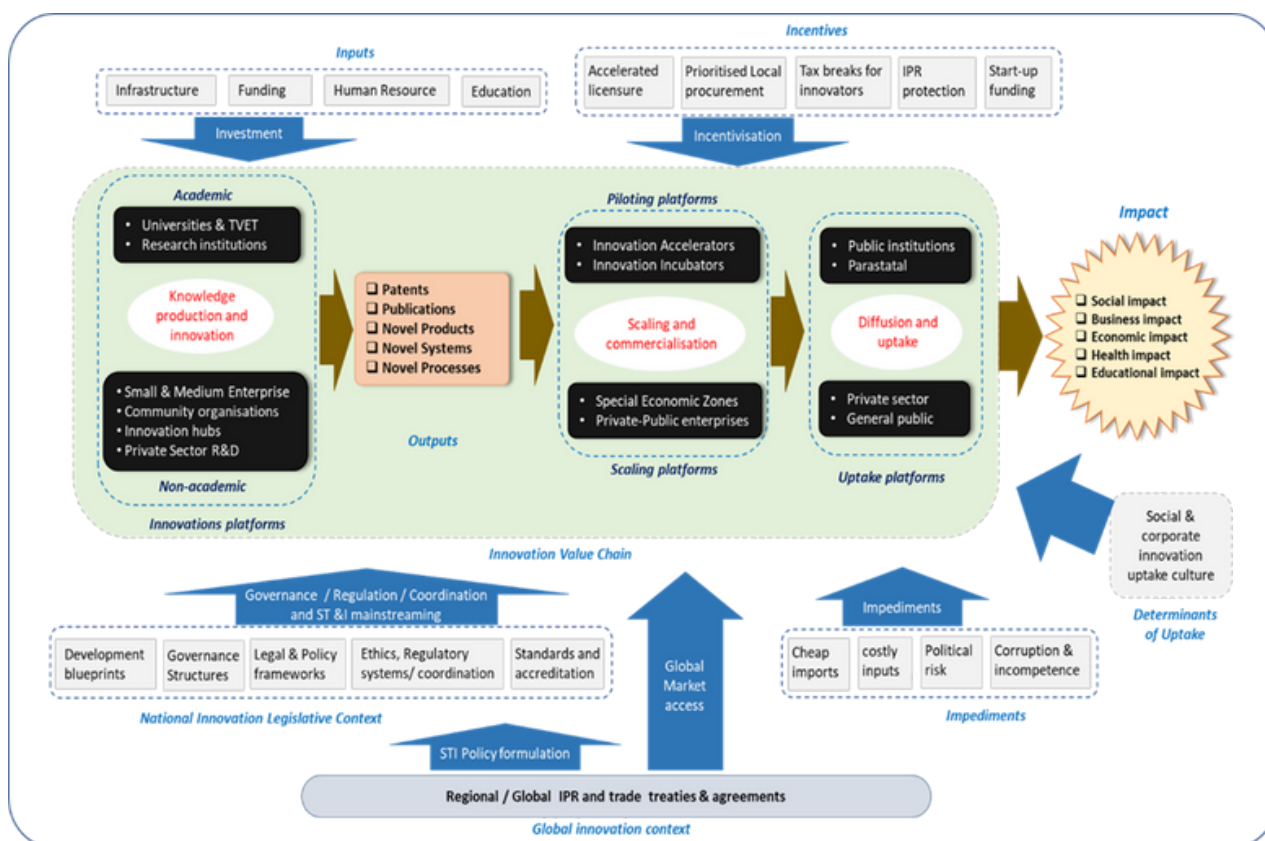
Figure 6: Innovation system Framework for the Kenya Innovation Outlook 2022

4.2 APPROACH TO DEVELOPING THE SCOREBOARD FOR THE KIO 2022

A scoreboard will provide a way for organizing and presenting specific indicators for the KIO 2022, in line with the identified domains and sub-domains. An innovation scoreboard has been used in different studies to present national, regional, or global innovation performance in a format that allows rapid review of the country's innovation status and comparisons with other countries, or the examination of national transitions. The scoreboard can indicate a composite single index such as a country's Global Innovation Index or allow individual components of the innovation system to be examined and compared.

The first step to developing a scoreboard is to identify the indicators that best reflect the status and performance of an innovation system (Figure 7). For this study, the identification of the indicators was guided by the framework and is discussed in more detail in the methodology section. Stakeholder consultations were carried out to identify indicators related to the specific domains and sub-domains. A detailed list of indicators was shared with eighty (80) stakeholders to assess their relevance. Through the stakeholder engagement, a list of indicators was developed, and the corresponding data was collected.
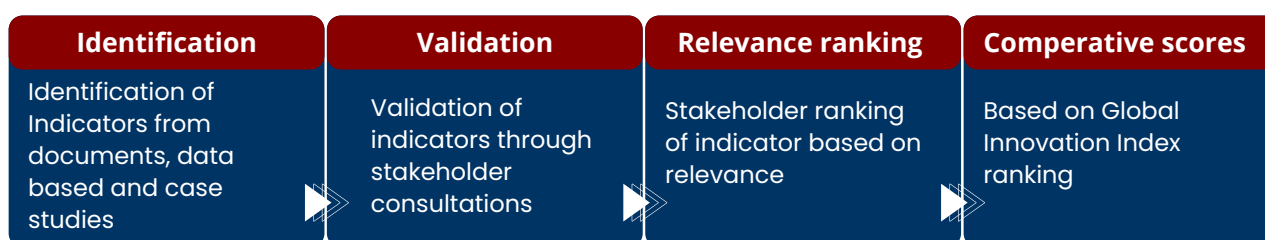
Identification	Validation	Relevance ranking	Comperative scores
Identification of Indicators from documents, data based and case studies	Validation of indicators through stakeholder consultations	Stakeholder ranking of indicator based on relevance	Based on Global Innovation Index ranking

Figure 7: Comparative scores – Country Ranking (where data availability allows)

Some of the data collated were already in formats that can be used to compare across countries, but a significant amount of data was not comparable across countries or time in their raw format and highly contextual nature. As such, two main approaches were employed to generate comparable scores, i.e., a) for indicators related to policies or governance structures, the existence or absence of a policy or structures was assigned a score of 1 or 0 respectively, and the summed-up score for all the existing policies or structures indicated the performance of the innovation policy indicator; b) for quantitative data such as enrolment in tertiary education, normalization was done by dividing the data by the base population and presenting as per capita students enrolled (or enrolment per 1 million citizens) to allow comparison between countries or periods with varying populations. To give a rating of the country's innovation performance, the scores for each indicator were further ranked against other country scores or categorized as high, medium, or low relative to the global distribution of scores or a set global/regional standard. Full details of how each score was generated and ranked are provided in Annex 2.

4.3 DATA COLLECTION

The data collection approach adopted was based on the NIS framework shown in Figure 6. The high-level components of the framework (labeled in blue text) were designated as domains and the elements within each domain as subdomains for which indicators were developed. This framework does not exclude other ways of describing Kenya's NIS, and the approach adopted is aimed at maintaining coherence and understanding presented in the outlook.

To assess each of these domains and subdomains, a set of specific indicators was identified. The type of data related to the indicator informed the choice of the data collection tools and analytical approach. In addition, the ease of collecting data for the various indicators was considered to guide the resources allocated to the exercise, while reliability and completeness of the data were considered, full details of the indicators are provided in Annex 1. In summary, three data collection methods were adopted:

4.3.1. Document and literature reviews

For the collection of data that is reliably archived in written form and easily extractable such as innovation financing, policies, guidelines, and laws, a desktop review of the documents obtained either from the relevant offices, organizational websites, or online databases was carried out. This method was also applied for quantitative data on innovation outputs such as publications and patents, and for indicators that have already been gathered and archived by other local and international entities and stakeholders.

4.3.2. Innovation cycle surveys

This approach was used to gather data on the innovation, commercialization, and uptake platforms. The surveys explored institutional structures, processes, and experiences in upscaling and commercializing research outputs and developing intra- and cross-sector linkages. This was sent to the heads of all target institutions by email. To enhance responsiveness, follow-up telephone calls were made to the relevant offices (such as the office of the student registrar). A total of 166 platforms, mapped out in the desktop review, were targeted. The data from the email survey was complemented by detailed interviews in a subset of 30 institutions (Table 1). The questionnaires can be accessed in the annexes presented in the following links: Academia and Research; Industry and Non-Academic Institutions; State agencies

Table 1: Summary of institutions targeted for the innovation value chain survey

TYPE OF INSTITUTION	INNOVATION PIPELINE	NO FOR BROAD-BASED WIDER SURVEY 32	NO DETAILED INTERVIEWS
Academic and Research Institutions	Knowledge Generation	65	8
Innovation Hubs and Technology transfer units	Commercialization	30	5
Startups	Knowledge commercialization	100	7
Private Institutions and Economic Zones	Market uptake	6	2
NGOs	Awareness and impact	20	3
State Agencies	Governance	15	5
TOTAL		166	30

4.3.3. Case studies of select innovations

The case studies approach was used to facilitate a deep dive analysis into exemplars of innovations in Kenya to further understand the innovation landscape and ecosystem. The case studies allowed the interrogation of selected innovations journey from conceptualization through to commercialization, the inputs, challenges and impact and opportunities for adoption. While we aimed at examining case studies from each domain, we could not secure interviews for some of the domains thus additional case studies were randomly selected while maintaining a set of agreed criteria after consultations from a review expert.

The following criteria were agreed upon and applied:
1. The innovation had a local origin and draws a national interest with its uniqueness, addressing a local societal challenge with the potential of the product/service having a regional and global impact through commercialization.
2. Had substantial technological, social, economic or governance impact at local, regional, or global level, evident in publicly available reports, review of national ST&I and economic reports and the recognition of the innovation through local and global awards.
3. The innovation cases from different regions in Kenya and across sectors highlight the country's development agenda.
4. Allowed a holistic interrogation of the main pillars of the innovation outlook, their relevance, and continuous monitoring

The participation was voluntary, and the information gathered was checked for relevance. About 20 cases were selected but only 10 were considered based on the relevance in addressing all key domains of the KIO.

A <u>case study</u> questionnaire was developed and validated. The analysis of the case studies followed the study framework and mapped the innovation knowledge sources, the scale-up journey, sources of funding and commercialization with a keen interest in the incentives, the impediments, and the supporting policies before examining the impacts. The cases studied included:
- Innovation from the public and private formal academic platforms,
- A private sector lab,
- Energy sector,
- Digitization sector,
- Agriculture and food systems,
- Environmental protection, and
- FinTech sectors.

The list of the case studies and the questionnaire used is attached in the Annex section (Annex 4).

4.4 DATA ANALYSIS AND PRESENTATION
The results are presented in two sections. The first section outlines the status of innovation in Kenya. This section combines descriptive statistics and a summary narrative of the synthesis of the data to provide a general picture of the current state of Kenya's innovation system. In this section, the quantitative data analysis looked at temporal trends, gender disaggregation, and distribution across development sectors and is presented in graphs and tables. For governance structures, policies, guidelines, and laws, the analysis focused on describing the historic development, roles, overlaps, and gaps in roles and jurisdiction, and the data is presented as narratives and in relational maps. For the case study, a thematic analysis of the narratives provided in the focus group discussion was combined with the output from the structured questionnaire and semi-structured interviews to provide a comprehensive description of the innovation's journey through its development pipeline.
The second section presents a scoreboard with a web-based platform. The scoreboard ranks the indicators based on relevance as provided by stakeholders, as well as against other African countries and globally. A digital portal has been developed (http://kio-sti.arin-africa.org/).. The scoreboard is presented using a web-based format to enhance user interaction and utility. It allows the user to select specific indicator comparator countries or periods, and the graphical comparisons. The platform is currently, hosted on the ARIN data centre but will be delivered to KeNIA once fully operational.