

[Development of a Framework and Roadmap  
for a National Innovation System to foster low-carbon  
and climate-resilient economic development in Zambia]

# Zambian Innovation Agency for Sustainable Development (ZIA)

Science and Technology Policy Institute (STEPI)

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Ministry of  
Technology and  
Science



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## ACRONYMS

GII: Global Innovation Index

NIS: National Innovation System

NGOs: Non-Governmental Organizations

R&D: Research and Development

STEM: Science, Technology, Engineering, and Mathematics

STI: Science, Technology, and Innovation

WIPO: World Intellectual Property Organization

ZIA: Zambian Innovation Agency



# Chapter 1. Introduction

## 1. Background

The results of Output 2 (Evaluation of the national innovation environment for climate action) and Output 3 (Development of a framework and roadmap for the establishment of a National Innovation System) highlight the urgent need for Zambia to modernize and diversify its economy. Currently, the country relies heavily on traditional sectors such as agriculture, mining, and manufacturing. To increase productivity and global competitiveness, Zambia must integrate low-carbon technologies and practices into its industrial and economic development efforts.

Zambia's commitment to sustainable development goals and the global emphasis on sustainability and environmental responsibility compel the country to align its development strategies with international environmental standards and commitments. In this context, there is an urgent need to create an agency focused on promoting Science, Technology, and Innovation (STI) in the country. This agency would lead initiatives to reduce carbon footprints and promote green technologies, contributing to Zambia's long-term sustainable development. Zambia's vulnerability to climate change impacts underscores the need for robust strategies to build climate resilience. The country faces significant challenges in adapting to and mitigating the effects of climate change. An innovation agency can facilitate the development and implementation of climate-smart technologies and practices, enhancing Zambia's capacity to respond effectively to climate-related challenges.

Human capital development is another critical area where the innovation agency can make a significant impact. Building and sustaining a skilled workforce in STI is essential for national development. The agency can play a pivotal role in capacity building, ensuring that the workforce has the skills and knowledge needed to drive innovation and economic growth. Global competitiveness increasingly depends on a country's ability to foster a culture of innovation and technological advancement. For Zambia to compete effectively in the global marketplace, it must create an enabling environment that promotes research and development (R&D), entrepreneurship,

and collaboration among various stakeholders. An innovation support agency can provide the framework and support necessary to cultivate such an environment.

Therefore, Zambia's journey towards sustainable development requires the establishment of a dedicated innovation support agency, the **Zambian Innovation Agency (ZIA)**. Such an agency can drive the adoption of advanced technologies and innovative practices critical to revitalizing these sectors.

## **2. Concept Overview**

The ZIA should be envisioned as a cornerstone of the National Innovation System (NIS), specifically tailored to support low-carbon and climate-resilient economic development. The ZIA will lead national STI programs and coordinate research agendas that prioritize sustainability. By focusing on green technologies and practices, the agency will support R&D initiatives aimed at reducing carbon emissions and enhancing climate resilience.

Furthermore, the ZIA will bridge the gap between research and market by facilitating the transfer and commercialization of innovative technologies, particularly those that are environmentally friendly and energy efficient. Capacity development will also be a key focus area for the ZIA, with programs designed to build skills and expertise in STI, emphasizing sustainability and climate resilience. Through training, workshops, and exchange programs, the agency will prepare the workforce to effectively implement and manage green technologies. In addition, the ZIA will manage funds dedicated to innovation, ensuring financial support for projects that focus on low-carbon and climate-resilient technologies. This financial support will include grants, loans, and investment programs aimed at spurring innovation in sustainable practices.

Strengthening linkages and collaboration between productive sectors, research institutions, and international partners will be another critical function of the ZIA. By fostering strong linkages, the agency will ensure that innovations are effectively integrated into the economy and contribute to sustainable development goals. Policy advocacy and strategic planning will also be central to the ZIA's role, as the agency will work to align national development goals with environmental sustainability and climate resilience.

In conclusion, the establishment of the ZIA represents a strategic initiative to harness the potential of STI for Zambia's sustainable and climate-resilient development. By driving innovation, supporting R&D, and fostering collaboration, the ZIA aims to transform Zambia into a competitive, knowledge-based economy that prioritizes low-carbon growth and resilience to climate change.

Against this backdrop, the purpose of this report is to present the concept and plan for the establishment of the ZIA, a national innovation support agency designed to catalyze Zambia's economic and technological advancement. This serves as the design work of the NIS on a meso level: introduction of institutional innovation support schemes. The establishment of the ZIA aligns with Zambia's Vision 2030 (Republic of Zambia, 2006) and the National Science, Technology and Innovation Policy (Ministry of Higher Education, 2020), which aim to transition from a low-income to a middle-income country by leveraging STI as key drivers of sustainable development, with a particular focus on low-carbon and climate-resilient economic growth.

### 3. Process and Methodology

In order to attain the purpose, the concept of the Zambian Innovation Support Agency concept was developed through the following process as shown in Figure 1.

[Figure 1] Concept Development Process for the Zambian Innovation Support Agency



. Source: Author's elaboration

#### Drafting the ZIA Proposal

First, the STEPI research team conducted an in-depth analysis of Zambia and its innovation environment to assess the current status based on the main findings from Output 2 and Output 3 of this Technical Assistance (TA). Based on this analysis, high-demand areas and essential elements were identified to focus on in the conceptual design<sup>1</sup> of the proposed agency. This draft detailed the proposed organizational structure, functions, and roles essential for the agency. Key areas of

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1 The conceptual design process in this report for Output 4 was mainly guided by the Master Plan for GIRC Centre by STEPI (2022).

focus proposed by the STEPI team included fostering innovation, supporting research and development (R&D), and promoting low-carbon and climate-resilient technologies.

### **Discussions: Collaborative Refinement and Prioritization**

The STEPI team and the NIS Working Group (Zambia)<sup>2</sup> then engaged in a collaborative refinement process, which was held in Zambia from 17<sup>th</sup> to 19<sup>th</sup> June 2024 as the fourth NIS Working Group Workshop. It utilized group discussions and various methodologies to identify and prioritize the agency's functions. This approach ensured that the proposal accurately reflected local needs and incorporated stakeholder feedback, thereby enhancing feasibility and relevance. Furthermore, the NIS Working Group conducted an Analytic Hierarchy Process (AHP) analysis to identify local perspectives on the primary functions of the ZIA. The objective of this discussion was to identify the most crucial functions of the ZIA in supporting innovation and provide detailed roles and responsibilities of each function, thereby guiding resource allocation and strategic planning.

To ascertain local perspectives on the primary functions of the ZIA, the NIS Working Group conducted an AHP analysis as shown in Figure 2. The objective of this analysis was to identify the most crucial functions of ZIA in supporting innovation, thereby guiding resource allocation and strategic planning.

This process involved 21 pairwise comparisons to assess the relative importance of each function. The AHP scale used was as follows:

- |                       |   |
|-----------------------|---|
| 1: Equal importance   | 3: Moderate importance                                    |
| 5: Strong importance  | 7: Very strong importance                                 |
| 9: Extreme importance | 2/4/6/8: Intermediate values for more nuanced comparisons |

The use of AHP allowed for a systematic and quantitative assessment of priorities, ensuring

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<sup>2</sup> See Appendix I for the full list of the participants of the NIS Working Group.

that the most critical functions received appropriate emphasis in the final proposal.

[Figure 2] Template for Evaluation of Key Functions Priorities Using AHP

With respect to ZIA key functions priorities, which criterion is more important, and how much more on a scale 1 to 9?

A - wrt ZIA key functions priorities - or B?		Equal	How much more?
1	<input checked="" type="radio"/> R&D analysis and planning <input type="radio"/> R&D activity support	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
2	<input checked="" type="radio"/> R&D analysis and planning <input type="radio"/> Technology commercialization	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
3	<input checked="" type="radio"/> R&D analysis and planning <input type="radio"/> Capacity Development	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
4	<input checked="" type="radio"/> R&D analysis and planning <input type="radio"/> Innovation financing	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
5	<input checked="" type="radio"/> R&D analysis and planning <input type="radio"/> Information Management System	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
6	<input checked="" type="radio"/> R&D analysis and planning <input type="radio"/> External cooperation	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
7	<input checked="" type="radio"/> R&D activity support <input type="radio"/> Technology commercialization	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
8	<input checked="" type="radio"/> R&D activity support <input type="radio"/> Capacity Development	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
9	<input checked="" type="radio"/> R&D activity support <input type="radio"/> Innovation financing	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
10	<input checked="" type="radio"/> R&D activity support <input type="radio"/> Information Management System	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
11	<input checked="" type="radio"/> R&D activity support <input type="radio"/> External cooperation	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
12	<input checked="" type="radio"/> Technology commercialization <input type="radio"/> Capacity Development	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
13	<input checked="" type="radio"/> Technology commercialization <input type="radio"/> Innovation financing	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
14	<input checked="" type="radio"/> Technology commercialization <input type="radio"/> Information Management System	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
15	<input checked="" type="radio"/> Technology commercialization <input type="radio"/> External cooperation	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
16	<input checked="" type="radio"/> Capacity Development <input type="radio"/> Innovation financing	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
17	<input checked="" type="radio"/> Capacity Development <input type="radio"/> Information Management System	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
18	<input checked="" type="radio"/> Capacity Development <input type="radio"/> External cooperation	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
19	<input checked="" type="radio"/> Innovation financing <input type="radio"/> Information Management System	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
20	<input checked="" type="radio"/> Innovation financing <input type="radio"/> External cooperation	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9
21	<input checked="" type="radio"/> Information Management System <input type="radio"/> External cooperation	<input checked="" type="radio"/> 1	<input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9

. Source: Author's elaboration using the platform, AHP Online System, accessed 18 June 2024

### Finalization of the Proposal

Upon completing the prioritization and refinement process, the final draft of the conceptual design of the ZIA was prepared by the STEPI team. This design incorporated the prioritized functions and reflected the collective input from the NIS Working Group. The final proposal aims to establish the ZIA as a cornerstone of Zambia's innovation system, driving sustainable and climate-resilient economic growth through targeted support to science, technology, and innovation.



## Chapter 2. Concept of ZIA

### 1. Outline

#### 1.1 Background

##### Current Status

According to the 2023 Global Innovation Index (GII) by the World Intellectual Property Organization (WIPO), Zambia is ranked 118<sup>th</sup> out of 132 global economies. Within the subset of 12 low-income group economies, Zambia is ranked 4<sup>th</sup>, and it holds the 16<sup>th</sup> position among the 28 sub-Saharan African economies. While Zambia has improved its ranking in innovation inputs to 111<sup>th</sup> compared to the previous year, its performance in innovation outputs has deteriorated, falling to 122<sup>nd</sup> place this year as shown in Figure 3.

[Figure 3] Zambia Global Innovation Index (GII) Ranking (2020-2023)

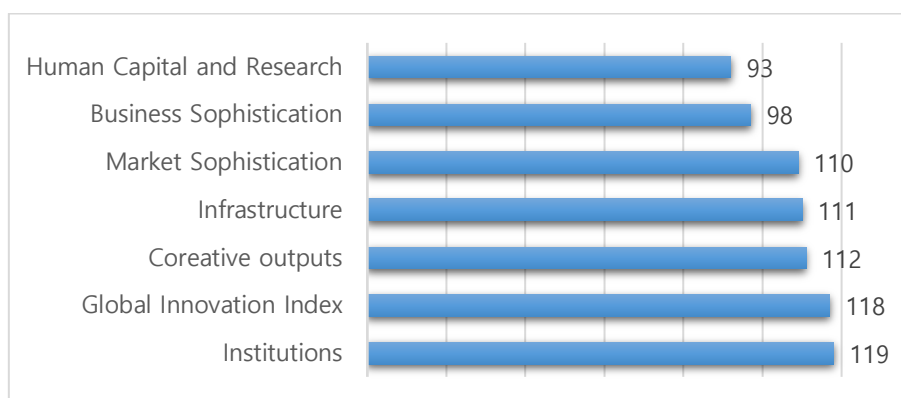
	GII Position	Innovation Inputs	Innovation Outputs
2020	122nd	109th	128th
2021	121st	111st	127th
2022	118th	118th	115th
2023	118th	111st	122nd

Source: WIPO (2023), "Global Innovation Index 2023: Zambia", p. 1.

Zambia outperforms the average of the low-income group in areas of Creative Outputs, Business Sophistication, Market Sophistication, Human Capital and Research, and Infrastructure, achieving its highest positions in the areas of Human Capital and Research (93<sup>rd</sup>), Business Sophistication (98<sup>th</sup>), Market Sophistication (110<sup>th</sup>), Infrastructure (111<sup>th</sup>), and

Creative Outputs (112<sup>th</sup>). Conversely, Zambia's performance falls below the regional average in Knowledge and Technology Outputs, Creative Outputs, and Institutions in the GII in 2023 as shown in Figure 4.

[Figure 4] Zambia's rankings in the seven areas of the GII in 2023



Source: Author's elaboration; WIPO (2023), "Global Innovation Index 2023: Zambia", p .4.

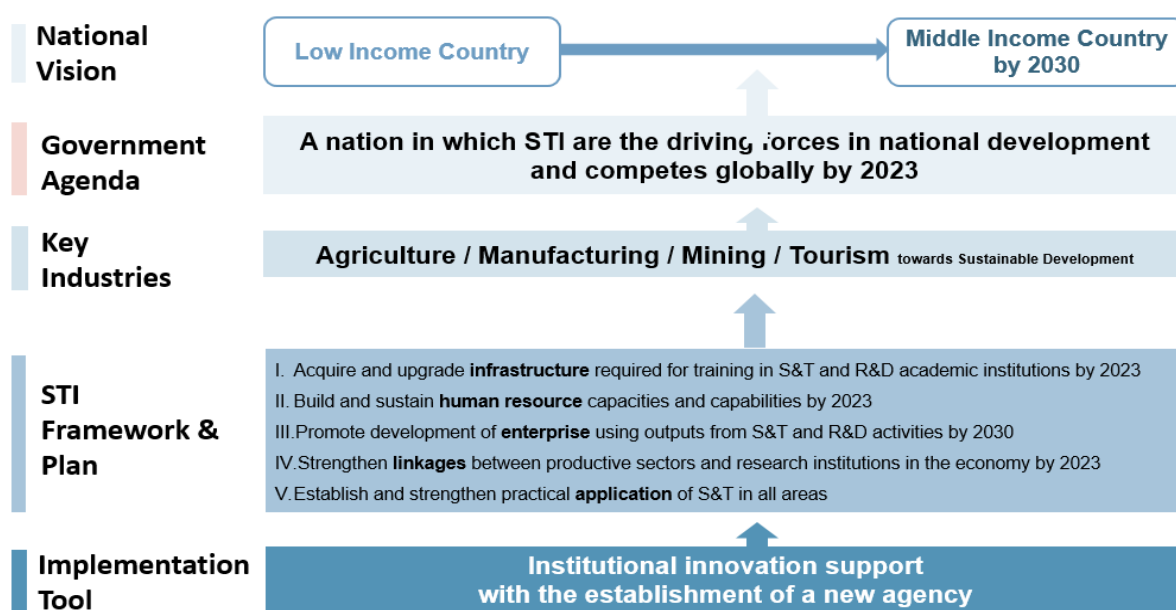
The 2023 GII identifies Zambia's strengths in sectors such as microfinance and industrial design. However, it also highlights significant challenges in innovation outputs and regulatory environments. The overall assessment suggests that while Zambia invests significantly in innovation, there is critical need to improve the efficiency of converting these investments into tangible outputs. In addition, Zambia faces data limitations in assessing the country's innovation status, with 23 indicators missing and 9 indicators containing outdated information. The gaps in data encompass areas such as entrepreneurship policies and culture, government funding per pupil, and tertiary enrolment, among others.

### **STI-led Growth**

Zambia aims to transition from a low-income to a middle-income country by 2030, striving to improve the quality of life through sustainable economic growth and poverty reduction as shown in Figure 5. To achieve this, the government intends to make STI the driving forces of national development and global competitiveness by 2023, emphasizing the critical role of technological advancement in economic progress. Key industries identified for sustainable development are Agriculture, Manufacturing, Mining, and Tourism, chosen for their potential

to leverage STI for improved productivity and economic diversification. The STI framework includes upgrading infrastructure for training in S&T and R&D by 2023, developing skilled human resources by 2023, promoting enterprises that use S&T and R&D outputs by 2030, enhancing collaboration between productive sectors and research institutions by 2023, and ensuring the practical application of S&T in all areas.

[Figure 5] VISION 2030 and Outline for STI-led Growth



Source: Author's elaboration based on Republic of Zambia (2006) and Ministry of Higher Education (2020)

Zambia's Vision 2030 is a strategic plan to harness STI for economic transformation, focusing on key industries and supported by a robust implementation framework to achieve sustainable development and global competitiveness. In this context, the establishment of a new innovation support agency will provide institutional support for innovation and coordinate the implementation of STI initiatives to effectively achieve the set objectives.

## 1.2 Layout

The layout of the ZIA in Figure 6 delineates its strategic positioning within the nation's STI ecosystem, highlighting its role as a key intermediary between various stakeholders at both national and global levels. At the heart of this ecosystem, the ZIA functions as the central

agency for STI support in Zambia, commissioned with responsibilities that include R&D planning and policy, support for R&D activities, technology commercialization, capacity development, and funding and investment.

In particular, the ZIA ensures the effective implementation of STI initiatives by coordinating efforts and fostering collaborations across these diverse stakeholders. This collaborative approach is essential for translating research and innovation into tangible socio-economic benefits, thereby advancing Zambia's vision of becoming a middle-income country through a robust and dynamic STI ecosystem. In summary, this positioning layouts three key functions of the ZIA: knowledge suppliers, facilitators, knowledge users.

### **Knowledge Suppliers**

The ZIA exchanges information with knowledge suppliers to foster innovation and scientific advancement. Domestically, this involves collaboration with public research institutes and universities, which serve as primary sources of research outputs and technological advancement. These institutions are crucial in providing the fundamental scientific knowledge and innovation necessary for the growth and sustainability of the STI ecosystem. By engaging with these knowledge suppliers, the ZIA ensures a continuous flow of cutting-edge research and technological innovation that underpins the development of various sectors.

### **Facilitators**

The ZIA plays a critical role in supporting government ministries and public institutions by providing policy direction, frameworks, and institutional support to facilitate the seamless operation and integration of STI initiatives within the national development agenda. The involvement of these facilitators is essential to ensure that the ZIA's strategic goals are aligned with national priorities, thereby creating enabling environment for STI initiatives to thrive. At the global level, the ZIA's interactions with international STI-related organizations, funding agencies, and foreign entities enhance Zambia's STI capacity by introducing international best practices, resources, and collaboration opportunities. These global interactions are important in strengthening Zambia's STI framework and expanding its innovation capabilities.

## **Knowledge Users**

Private innovation organizations and private companies are the primary beneficiaries of the STI outputs facilitated by the ZIA. The agency empowers these entities to harness the innovations and technological advancements generated within the ecosystem, thereby stimulating economic activity, improving productivity, and promoting economic diversification. By facilitating the commercialization of research outputs and the implementation of new technologies, the ZIA plays a crucial role in ensuring the practical application of STI. This not only drives economic growth but also contributes to sustainable development by addressing real-world challenges through innovative solutions.

## **1.3 Scope**

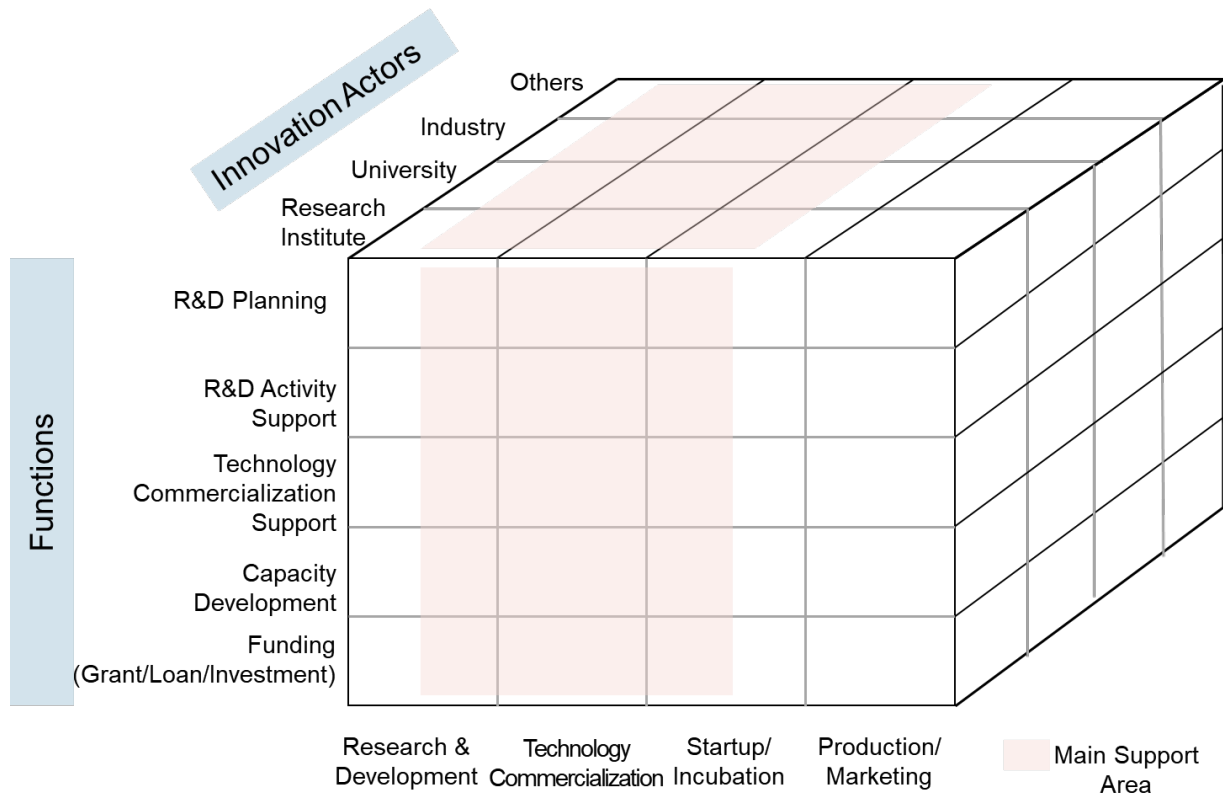
The depicted scope of the ZIA shown in Figure 7, illustrates its comprehensive role within the national innovation ecosystem. This framework categorizes the ZIA's interactions with various innovation actors, describes functions it employs, and highlights the primary support areas it focuses on to facilitate STI development.

Considering Zambia's development stage in STI and its limited resources, we believe that the ZIA needs to focus on applied R&D rather than basic R&D, facilitation of technology commercialization<sup>3</sup>, and incubation of innovations for startups and small businesses rather than big companies. They are the reasons behind the exclusion of the half of the R&D segment and that of the Startup/Incubation segment.

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<sup>3</sup> It includes support for developing a prototype, acquiring intellectual property rights, negotiating licensing agreements, establishing a technology information platform, etc.

[Figure 6] Scope of ZIA



Source: Author's elaboration based on STEPI (2022)

### Innovation Actors

The ZIA engages with a diverse group of innovation actors including research institutes, universities, industries, and other entities. Research institutes and universities generate basic research and scientific advancements, industries focus on commercialization and market application of innovations, and other entities provide additional resources and expertise to support the ecosystem.

### Functions

The ZIA can provide a range of functions to support and nurture the STI ecosystem. These functions include R&D planning, R&D activity support, technology commercialization support, capacity development, and funding mechanisms such as grants, loans, and investments. R&D planning can ensure that research activities are strategically aligned with national development priorities, while R&D activity support can facilitate the implementation

of these research projects. Technology commercialization support helps transform research and innovation outputs into viable market products. Capacity development focuses on building the necessary skills and expertise within the innovation workforce. Funding mechanisms provide the financial resources required to sustain and scale up innovation activities.

### **Main Support Areas**

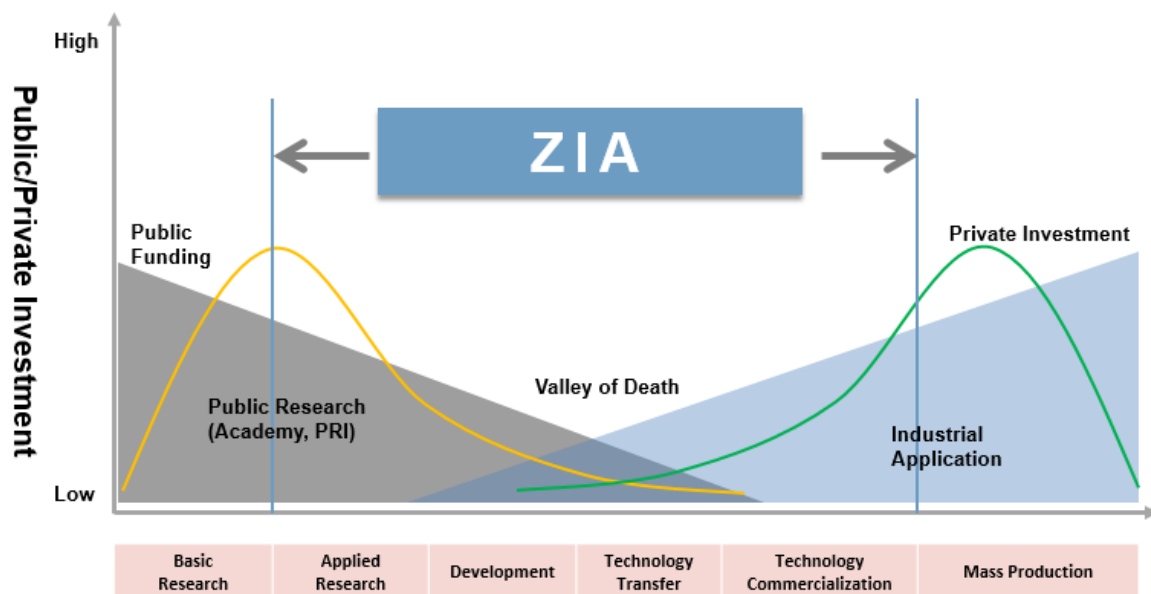
The main support areas where the ZIA concentrates its efforts include research and development, technology commercialization, and start-up incubation. Within the research and development domain, the ZIA supports basic and applied research initiatives that drive technological advancements, while more focused on applied side considering the level of science and technology. Technology commercialization involves bridging the gap between research and the market, ensuring that innovations reach end-users and generate economic value. Start-up incubation provides a nurturing environment for nascent companies, offering resources and mentorship to accelerate their growth.

In summary, the ZIA plays a multifaceted role in fostering a robust STI ecosystem in the country. By working with diverse innovation actors, deploying a range of policy tools, and focusing on critical support areas, the ZIA aims to drive national development through sustained scientific and technological innovation. This strategic approach ensures that Zambia's innovation ecosystem is well equipped to address current challenges and seize future opportunities, thereby contributing to the nation's economic growth and global competitiveness.

In Figure 8, the diagram illustrates the positioning of the ZIA within the innovation process, highlighting its critical role in bridging the gap between public and private investment at the different stages of innovation development. The vertical axis represents the level of investment, ranging from low to high, while the horizontal axis outlines the innovation process, from basic research to mass production. Initially, public funding predominantly should support the early stages of innovation, including basic and applied research, typically conducted by academic institutions and public research institutes. As the process progresses towards development and technology transfer, the ratio of public investment compared to

private one often declines, creating a critical juncture known as the "Valley of Death." The "Valley of Death" refers to a phase where promising innovations face significant funding challenges, mainly due to the high risks and uncertainties associated with the transition from research to commercial (both technological and market) viability. This phase is characterized by declining the portion of public investment before that of private investment becomes substantial, and represents a significant barrier to the successful commercialization and application of new technologies.

[Figure 7] Positioning of ZIA in the Innovation Process



Source: Author's elaboration based on STEPI (2022)

Strategically positioned in this innovation process, the ZIA plays a key role in mitigating the risks and challenges associated with the Valley of Death. By providing targeted support and bridging the funding gap, the ZIA facilitates the transition of innovations from the research phase to industrial application and technology commercialization. This support includes facilitating technology transfer, promoting development activities, and enabling technology commercialization to ensure that innovations can progress towards market readiness and mass production.

## **2. Strategy**

### **2.1. Vision**

The vision of the ZIA is to become a national leader in innovation support, aimed at building a healthy innovation ecosystem that promotes new scientific and technological knowledge and therefore, sustainable development in Zambia. This vision underscores the ZIA's commitment to positioning itself at the forefront of national efforts to enhance scientific and technological capacities, ultimately contributing to the country's long-term socio-economic growth.

### **2.2. Mission**

The ZIA's mission is to contribute to advancing innovation and sustainable development by supporting the STI ecosystem in Zambia. This mission highlights the agency's role in facilitating and nurturing innovation processes, ensuring that scientific and technological advancements are effectively integrated into the national development agenda.

### **2.3. Values**

The ZIA operates based on three core values:

- **Transparency:** Emphasizing openness and accountability in its operations and decision-making processes.
- **Inclusiveness:** Ensuring broad participation and equal opportunities for all stakeholders within the innovation ecosystem.
- **Sustainability:** Committing to long-term environmental, economic, and social sustainability in all initiatives and projects supported by the agency.

### 2.3. Functions

The ZIA's functions are designed to cover critical aspects of the innovation process, ensuring comprehensive support for STI activities:

- **Research & Development Analysis & Planning:** Conducting thorough analyses and strategic planning to guide R&D efforts in alignment with national priorities.
- **Research & Development Support:** Providing necessary support for the execution of R&D activities, ensuring that research projects have the resources and guidance needed to succeed.
- **R&D Commercialization:** Facilitating the transition of research outputs into commercially viable products and services, bridging the gap between innovation and market application.
- **Capacity Development:** Building and enhancing the skills and capabilities of individuals and institutions within the STI ecosystem to ensure a competent and innovative workforce.
- **Innovation Funding and Investment:** Offering financial resources through grants, loans, and investments to support innovation projects, ensuring that promising initiatives have the funding required to progress and scale.

Monitoring and Evaluation and Impact Assessment will be operated mechanisms of monitoring and evaluation and impact assessment at both organizational and program levels.

The Figure 9 outlines proposed vision, mission, values, and core functions of the ZIA, illustrating its strategic framework and operational focus in fostering STI ecosystem in Zambia. The ZIA's strategic framework is designed to foster a dynamic and sustainable STI ecosystem in Zambia. By adhering to its vision, mission, and values, and through the execution of its core functions, the ZIA aims to drive innovation, enhance national competitiveness, and contribute to the country's sustainable development goals.

[Figure 8] Strategy of ZIA



Source: Author's elaboration

### 3. Internal System

#### 3.1. Governance

Establishing governance is important for the ZIA to function effectively and achieve its role and performance. Based on the discussions by the NIS Working Group, there was a consensus to position the ZIA under the NC-STI (National Council for STI).

This option was preferred for several reasons:

- **Facilitated Funding and Resource Mobilization:** As an organization chaired by the President, it ensures easier access to funding and resource mobilization.
- **Clear Accountability and Policy Implementation:** The structure allows for clear accountability and a higher likelihood of policy implementation.
- **Enhanced Expertise through Broad Participation:** It can secure specialized expertise

through the participation of diverse public and private sectors.

However, the working group also noted that there would be a need for:

- Integration and Coordination among Stakeholders: Effective integration and coordination among the participating stakeholders.
- Prevention of Role Duplication: Measures to prevent the duplication of roles among different agencies.

This conclusion reflects the group’s consideration of the optimal governance structure to support the ZIA’s mission of advancing innovation and sustainable development in Zambia.

Advantages and disadvantages of the governance for the ZIA is summarised in Table 1.

[Table 1] Advantages and Disadvantages of the governance

Governance	Advantage	Disadvantage
<p>establishing ZIA as a new agency and operating it as an agency <b>under a New Council for STI</b></p>	<ul style="list-style-type: none"> <li>• Easy access to funding</li> <li>• Focussed mandate, ensuring efforts are streamlined.</li> <li>• Specialised expertise</li> <li>• Increased visibility</li> <li>• Autonomy, leading to better decision-making</li> <li>• Clear accountability</li> <li>• May command some sort of authority</li> <li>• Will attract more funding and private sector participation</li> <li>• easy resource mobilisation</li> </ul>	<ul style="list-style-type: none"> <li>• Integration challenges</li> <li>• High setup costs</li> <li>• Duplication of roles of other agencies</li> <li>• May be difficult to set up and/or create conflict since there are some structures in place</li> </ul>

Source: The NIS Working Group’s elaboration based on the STEPI team’s initial plan

### 3.2. Organisational Structure

Based on the seven functions proposed by the STEPI team, detailed descriptions and programs were identified by the NIS Working Group. Detailed explanations and programs for each function were decided through group discussions. Each function was allocated to one team, and through the group discussion, each team was allocated with its own corresponding policy targets, roles, and operation programs.

## **R&D analysis and planning team**

The team will be responsible for aligning all research funding, operationalizing and coordinating the National Research Agenda (NRA), designing a robust legal and policy framework.

- *R&D policy analysis and reviews:* Conduct thorough analysis of existing R&D policies to identify their strengths, weaknesses, opportunities, and threats, and develop comprehensive reports and policy briefs to inform decision-makers and stakeholders.
- *Organization and program assessment:* Design evaluation frameworks and assess the performance and impact of R&D programs and initiatives in ZIA.
- *Determination of strategic areas:* Set achievable R&D targets that align with Zambia's national development goals that support sustainable development, gender mainstreaming, and youth support.

In order to do so, it will conduct R&D policy analysis and reviews, program assessment, evaluation of current R&D landscape, mapping and risk assessment of ZIA's operation, setting National R&D objectives and targets. The team will support inclusive policy development that gender and youth perspectives are integrated into the development of all policies and plans by using gender and youth-sensitive indicators and engaging women and young researchers during the design stage.

In principle, this team will work as a core think tank for the ZIA. It will conduct R&D Surveys and needs assessments of key stakeholders, design an information management system and R&D collaboration platform.

## **R&D activity support team**

The team will be responsible for providing necessary support for the execution of R&D activities by innovation actors, including universities, research institutes, and private sector companies. Main roles include R&D program planning and operation by providing R&D grants.

- *R&D program planning:* Develop R&D programs by identifying, surveying, and prioritizing R&D needs from relevant public and private stakeholders.

- *R&D program operation:* Operate R&D programs by reviewing proposals, monitoring the progress and outputs of projects, and assessing their impacts.

In order to do so, it will develop and operate relevant R&D support programs, for example, sector specific mission oriented programs or multi-sector research programs. Priorities will go to strategic areas that can pursue sustainable development, gender mainstreaming, and youth support. The team will make efforts to ensure equal access and opportunities to funding for women and young researchers. For example, it can introduce grants specifically aimed at supporting research projects led by women or young researchers.

### **Capacity development team**

The team will be responsible for building and enhancing the skills and capabilities of individuals and institutions within the STI ecosystem to ensure a competent and innovative workforce.

- *Scholarship programs:* Run international exchange programs and support domestic science, technology, engineering, and mathematics (STEM) students with scholarships, and developing incentive programs for researchers
- *Training and workshops:* Provide training and workshops and run online programs to enhance the skills and knowledge of researchers and innovators.
- *Mentoring and networking:* Connect researchers with private sector and facilitate collaboration and knowledge sharing among researchers, industry, and academia.

In order to do so, it will implement international exchange programs and domestic scholarships, skills and innovation hubs, challenges and awards programs for increasing awareness of females and youth. In particular, the team will develop tailored capacity development programs for women and young researchers to ensure equal access and opportunities.

### **Innovation financing & technology commercialization team**

The team will be responsible for facilitating the transition of research outputs into commercially viable products and services, bridging the gap between innovation and market application.

- *Innovation financing:* Assist development of a prototype and co-fund product development and process improvement.

- *IPR Management Support:* Assist acquisition of intellectual property rights for R&D outputs, negotiation of licensing agreements, etc.
- *Commercialization support:* Run technology guarantee program and establish a technology bank platform to facilitate technology transfer among innovation actors.

In order to achieve the goals, it will implement technology guarantee program, develop and manage the technology guarantee fund, bottleneck technology support program, technology commercialization support program, Industry-University-Research institute exchange meetings. It will provide special programs for women and young entrepreneurs to commercialize their research outputs and innovations such as incubation and training programs on intellectual property, marketing, etc.

### **Information management system team**

The team will be in charge of establishing and running information management systems.

- *R&D information management:* Develop and operate national STI information management system to digitally manage national R&D projects efficiently
- *Knowledge platform support:* Develop and operate a web-based platform to create a space for online capacity development, information and knowledge sharing platform, and networking.

On the web-based platform, the team will create a dedicated space to collect data, monitor, and analyze the participation of women and young researchers in R&D activities. Additionally, the platform will offer training and support for these groups, focusing on funding opportunities and specialized training programs.

### **External cooperation team**

The team will be responsible for all external relations with external stakeholders and public relations for the ZIA.

- *Stakeholder Engagement:* Build and maintain relationships with key external stakeholders, including government ministries and agencies, universities, industry partners, non-

governmental organizations (NGOs), and international bodies.

- *Public Relations and Communication:* Manage the organization's public communication with external stakeholders and the Zambian citizens. Develop and disseminate press releases, newsletters, and other communication materials in order to promote the organization's initiatives and achievements.

By fulfilling these responsibilities, the External Cooperation Team ensures that the ZIA effectively engages with external stakeholders. The team also handles all public relations and communication issues on behalf of the ZIA. Specifically, the team will promote collaborative projects focusing on gender issues in science and technology with international partners. Additionally, they will organize events dedicated to promoting gender equality in R&D and creating spaces for young researchers to share their activities.

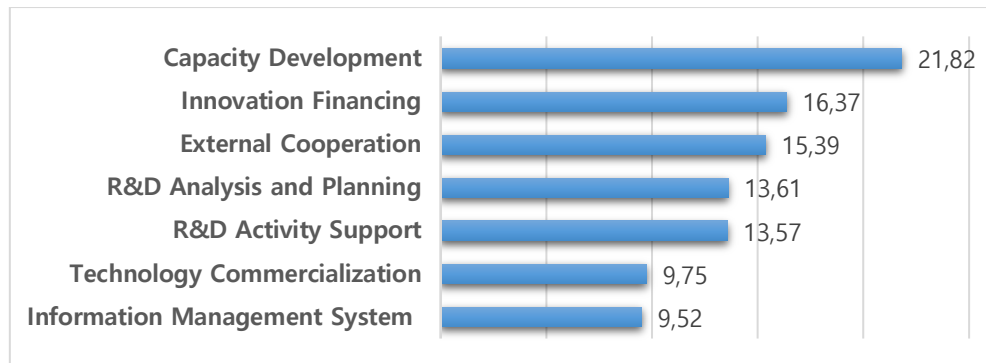
[Table 2] ZIA's Organizational Structure, Policy Targets, Job Description, and Potential Programs

Organizational Structure	Corresponding Policy Targets	Job Description	Potential Programs
<b>R&amp;D Analysis &amp; Planning Team</b>	<ul style="list-style-type: none"> <li>Align all research funding</li> <li>Operationalize and coordinate the National Research Agenda (NRA)</li> <li>Design a robust legal and policy framework for STI</li> </ul>	<ul style="list-style-type: none"> <li>R&amp;D policy analysis and reviews</li> <li>Program assessment</li> <li>Evaluation of current R&amp;D landscape</li> <li>Mapping and risk assessment</li> <li>Setting National R&amp;D objectives and Targets</li> </ul>	<ul style="list-style-type: none"> <li>Conduct R&amp;D Surveys</li> <li>Needs Assessments</li> <li>Create an Information management system</li> <li>R&amp;D collaboration platform</li> </ul>
<b>R&amp;D Activity Support Team</b>	<ul style="list-style-type: none"> <li>Enhance practical application of STI in all economic sectors</li> <li>Increase R&amp;D investments to 2% of GDP</li> </ul>	<ul style="list-style-type: none"> <li>Engagement with relevant public and private stakeholders</li> <li>Development of relevant R&amp;D support programs</li> <li>Provision of incentives in R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>Sector Specific Mission Oriented Program</li> <li>Multi-sector Research Program (Industries, universities)</li> </ul>
<b>Capacity Development Team</b>	<ul style="list-style-type: none"> <li>Promote STEM graduates and skilled technicians in the core sector pillars (Agriculture, Manufacturing, Mining and Tourism) to 70%</li> <li>Increase number of researchers and scientists by 20%</li> </ul>	<ul style="list-style-type: none"> <li>Scholarships; international exchange programs; online programs</li> <li>affirmative action for science students</li> <li>specialised public technology and innovation university</li> <li>incentives for researchers</li> </ul>	<ul style="list-style-type: none"> <li>Mentorship and coaching programs</li> <li>Trade schools ,skills and innovation hubs(programs &amp; certification)</li> <li>Challenges and Awards programs</li> </ul>
<b>Innovation Financing &amp; Technology Commercialization Team</b>	<ul style="list-style-type: none"> <li>Increase funding for innovations by 20%</li> <li>Strengthen linkages between and among STI stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Operating innovation funds</li> <li>Establish a framework for Technology guarantee &amp; investment</li> <li>Providing solutions to bottleneck technologies</li> <li>Facilitating technology transfer &amp; commercialization</li> <li>Innovation investment fund</li> </ul>	<ul style="list-style-type: none"> <li>Technology guarantee program</li> <li>Develop and manage the technology guarantee fund</li> <li>On-Site Bottleneck Technology Support Program</li> <li>Technology Commercialization Support Program</li> <li>I-U-R Exchange Meetings</li> </ul>
<b>Information Management System Team</b>	<ul style="list-style-type: none"> <li>Create a database for all scientific research in Zambia</li> </ul>	<ul style="list-style-type: none"> <li>Managing national R&amp;D projects efficiently</li> <li>Operating STI Information System</li> </ul>	<ul style="list-style-type: none"> <li>Project Management System</li> <li>Upgrading &amp; maintaining the STI Information System</li> </ul>
<b>External Cooperation Team</b>		<ul style="list-style-type: none"> <li>Networking with international organizations</li> <li>promoting co-operations with them</li> </ul>	<ul style="list-style-type: none"> <li>Media and PR.</li> <li>International/regional STI Symposiums</li> </ul>

Source: The NIS Working Group's elaboration based on the STEPI team's initial plan

In addition to each team’s functions and programs, the priorities of the seven functions were derived through AHP analysis in case the Zambian government needs to implement these functions step by step due to limited resources. The functions with high priorities are Capacity Development, Innovation Financing, External Cooperations as shown in Figure 10.

[Figure 9] Prioritization of Key Functions of ZIA through AHP Analysis<sup>4</sup>



. Source: The NIS Working Group’s elaboration based on the STEPI team’s initial plan

① Capacity Development (21.82%)

Identified as the most critical function, capacity development focuses on enhancing and improving organizational capabilities. This includes strengthening the expertise of personnel and running educational programs.

② Innovation Financing (16.37%)

Ranked as the second most important function, innovation financing involves providing financial support to ensure new ideas and technologies can successfully enter the market.

③ External Cooperation (15.39%)

Recognized as highly significant, external cooperation entails creating synergies through collaboration with international organizations, other countries, external institutions, industries, and academia. This includes joint research, technology transfer, and international partnerships.

④ R&D Analysis and Planning (13.61%)

Essential for enhancing the effectiveness of research and development activities, this function

<sup>4</sup> The individual response results can be found in Appendix II.

involves evaluation, analysis, and planning. It includes setting research directions, evaluating projects, and strategic R&D planning.

⑤ R&D Activity Support (13.57%)

This function focuses on supporting actual R&D activities, such as providing laboratory facilities, technical assistance, and building research infrastructure.

⑥ Technology Commercialization (9.75%)

Involves patent filing, licensing, and developing market entry strategies, ensuring that innovations can be effectively brought to market.

⑦ Information Management System (9.52%)

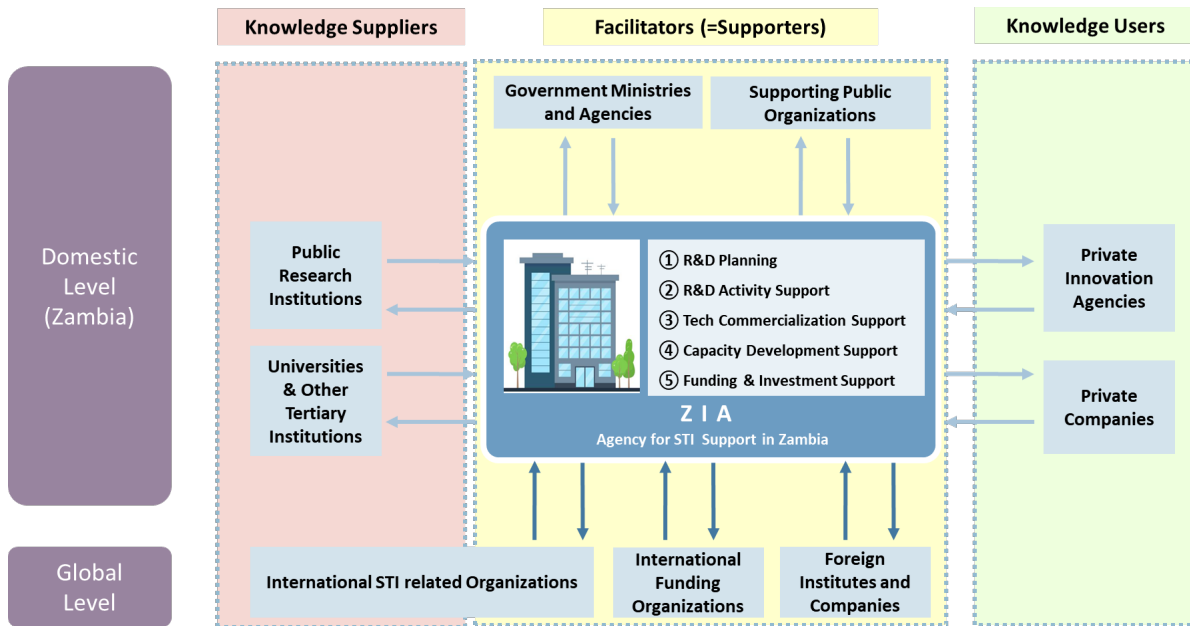
Ranked lowest in priority, this function involves managing and analysing data related to research and innovation activities. It includes building databases and operating information-sharing platforms.

### **3.3. Final Outcomes**

In the initial proposal, five of the typical seven functions of an innovation support agency were suggested for Zambia, excluding technology commercialization and innovation financing, based on the current state of the country's innovation environment. However, discussions with the NIS Working Group and subsequent AHP analysis highlighted the importance of all functions. Therefore, the two excluded functions of technology commercialization and innovation financing are combined into one team to include their roles. Consequently, the final outcome of the ZIA with positioning in STI system, strategy, and organizational chart is shown in Figure 11.

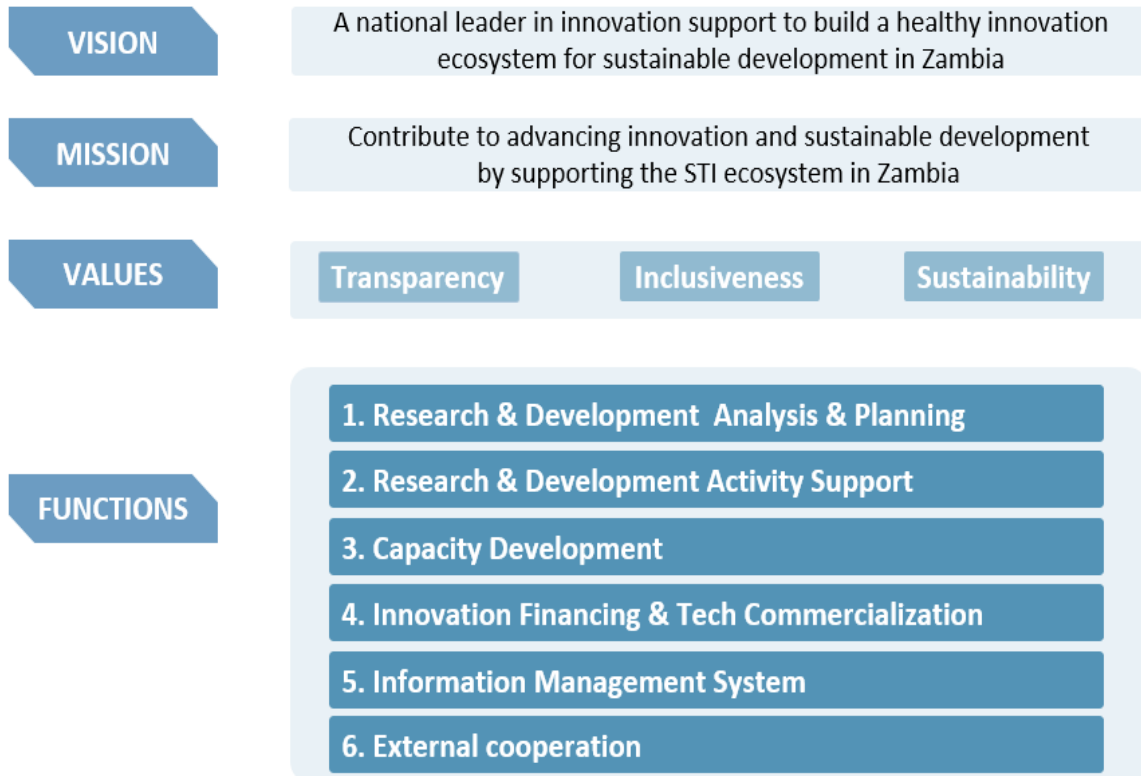
[Figure 10] Final Feature of ZIA

### A. Positioning in STI System



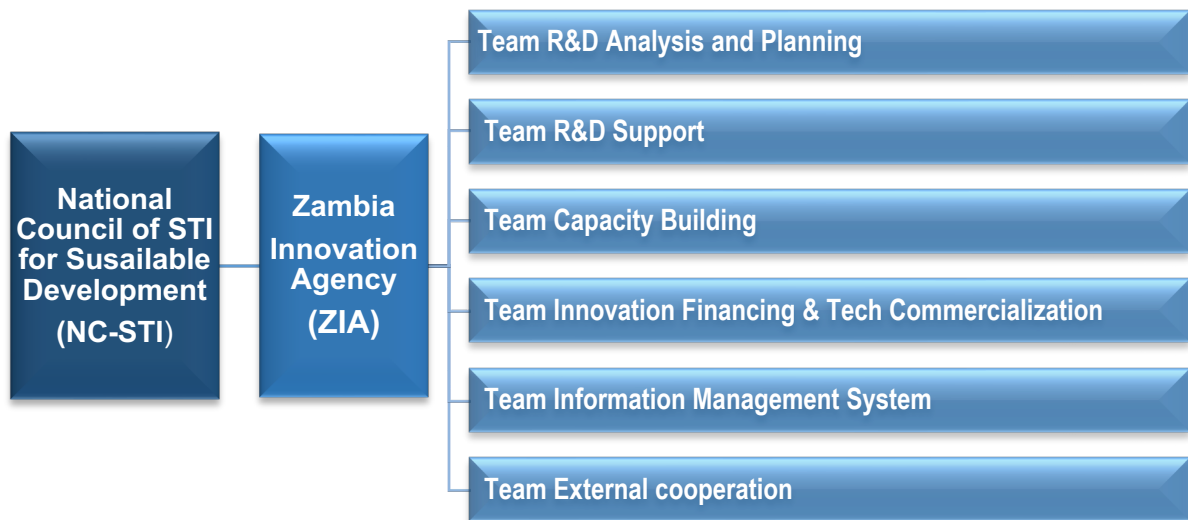
. Source: The Zambia NIS Working Group’s elaboration based on the STEPI team’s initial plan

### B. Strategy



. Source: The Zambia NIS Working Group’s elaboration based on the STEPI team’s initial plan

### C. Organisation Chart



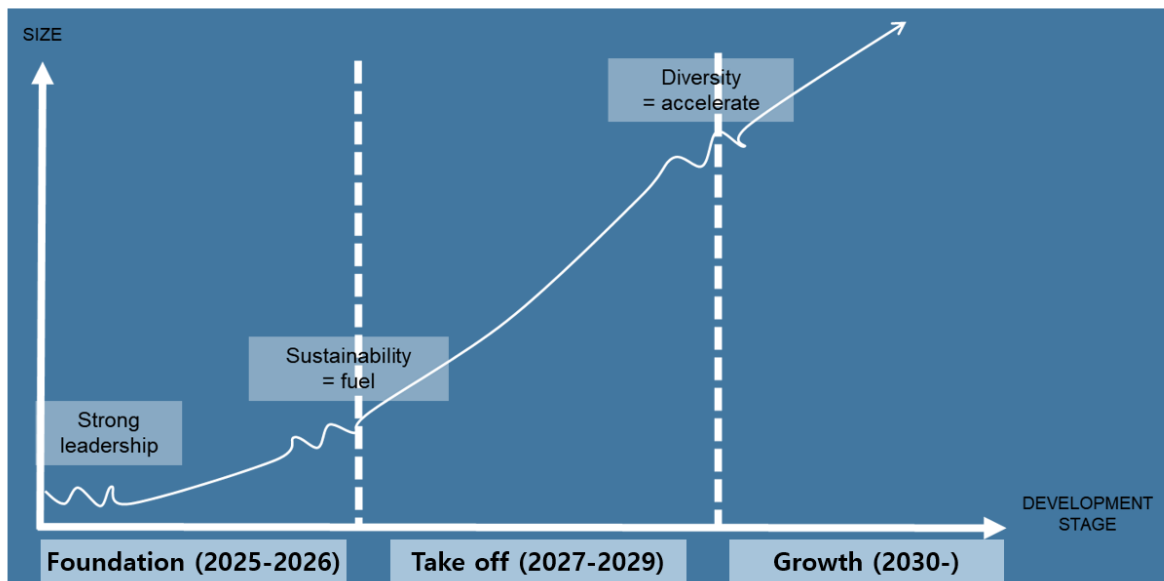
. Source: The Zambia NIS Working Group's elaboration based on the STEPI team's initial plan

## Chapter 3. Implementation Plan

### 1. Roadmap

The diagram illustrates the projected roadmap of the ZIA, delineating the growth trajectory in terms of size and development phases from 2025 onward.

[Figure 11] Roadmap of ZIA



Source: Author's elaboration based on STEPI (2022)

#### Foundation Stage (2025-2026)

During the Foundation Stage, ZIA is expected to lay the groundwork for its establishment and future activities. In order to establish the organization, a preparation team will develop a strategic plan of ZIA with defining mission, vision, scope, and organizational composition and support MOTS to establish a legal and regulatory framework for ZIA with securing required budget. This initial phase is characterized by the establishment of strong leadership, which is crucial for setting

a clear vision and direction. The focus will be on building the institutional framework, defining strategic goals, and mobilizing initial resources. This period involves significant groundwork to ensure that the agency is well-positioned for subsequent growth.

### **Take off Stage (2027-2029)**

Following the foundational period, the Take off Stage marks a critical phase of accelerated growth and development. Sustainability is identified as the key driver during this stage, acting as the "fuel" that propels ZIA's operations and initiatives. The emphasis will be on developing sustainable practices, securing consistent funding sources, and establishing robust operational processes. The agency's activities will expand, leveraging initial successes to attract further investments and partnerships. This stage is pivotal for demonstrating the agency's potential and setting the stage for future scalability.

### **Growth Stage (2030 and Beyond)**

Entering the Growth Stage, ZIA is expected to experience significant expansion and diversification of its activities. Diversity is identified as the accelerating engine for this phase, signifying the broadening of ZIA's scope and the integration of various innovative projects and collaborations. This period will see the agency scaling up its operations, increasing its impact across different sectors, and solidifying its role as a national leader in innovation support. The focus will be on enhancing capacity, fostering innovation ecosystems, and driving comprehensive economic development through sustained technological advancements.

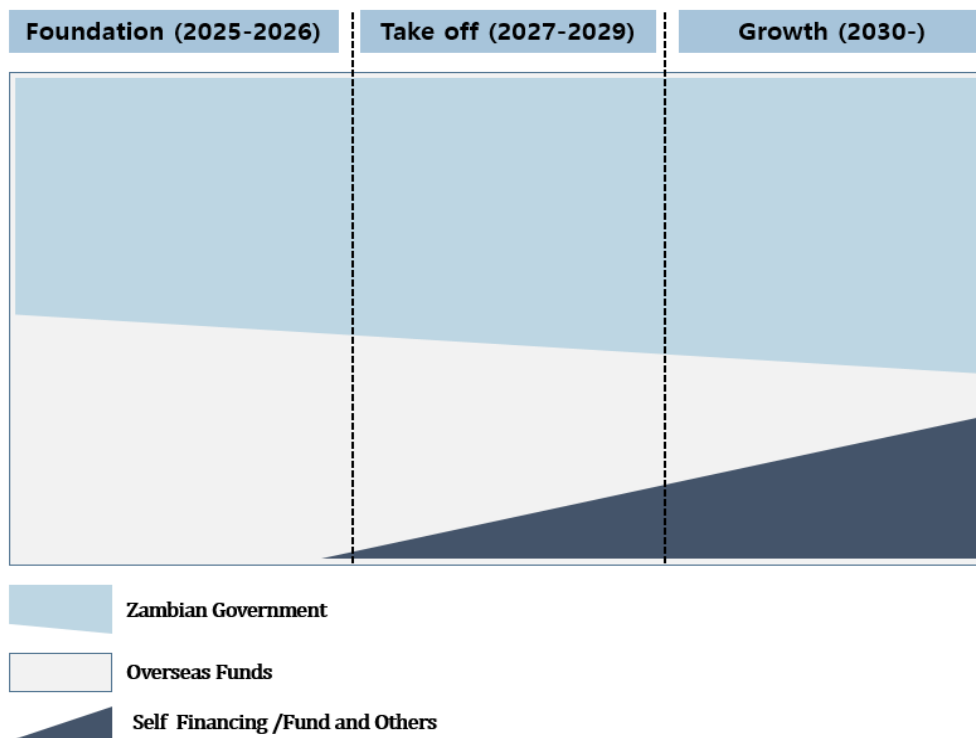
The projected roadmap of ZIA's trajectory underscores a strategic approach to building a robust and sustainable innovation agency. From establishing strong leadership in the Foundation Stage to achieving sustainability in the Take off Stage and accelerating growth through diversification in the Growth Stage, each phase is designed to build upon the previous one. This structured growth model aims to ensure that ZIA can effectively support and drive innovation, contributing to Zambia's socio-economic development in a sustainable and impactful manner.

## 2. Budget Plan

Securing a sustainable and adequate budget is another significant challenge for the ZIA. Financial resources are vital for the agency to carry out its programs, support research and development activities, and invest in necessary infrastructure. The budget must cover both initial setup costs and ongoing operational expenses. Ensuring a reliable funding stream from the Zambian government, complemented by international funds and self-financing mechanisms, is crucial for the agency's sustainability and effectiveness. Budgetary constraints can limit the scope and impact of the ZIA's initiatives. Therefore, it is crucial to have a rigid business model of the ZIA.

The Figure 10 illustrates the anticipated evolution of funding sources for the ZIA over three distinct development stages: Foundation (2025-2026), Take off (2027-2029), and Growth (2030 and beyond). It highlights the relative contributions from the Zambian government, overseas funds, and self-financing/other sources.

[Figure 12] Change of Budget Sources over time



Source: Author's elaboration based on STEPI (2022)

### **Foundation Stage (2025-2026)**

In the Foundation Stage, the Zambian government is expected to be the primary source of funding for ZIA. This substantial governmental support is crucial for establishing the agency's foundational infrastructure, leadership, and initial operational capabilities. During this phase, overseas funds and self-financing/other sources contribute minimally. The emphasis on government funding reflects the need for strong state support to ensure the successful inception of the agency.

### **Take off Stage (2027-2029)**

As ZIA transitions into the Take off Stage, there is an anticipated diversification of funding sources. While the Zambian government continues to play a significant role, the proportion of overseas funds begins to increase. This shift indicates growing international interest and investment in Zambia's innovation initiatives. Simultaneously, there is a gradual rise in self-financing and other sources, reflecting the agency's efforts to generate internal revenue and secure alternative funding streams. This diversification is critical for enhancing the financial sustainability of the ZIA during its expansion phase.

### **Growth Stage (2030 and Beyond)**

In the Growth Stage, the funding landscape for the ZIA is expected to become more balanced and diversified. The contributions from the Zambian government, overseas funds, and self-financing/other sources are more evenly distributed. The significant increase in self-financing and other sources during this phase indicates that the ZIA has developed robust mechanisms for generating its own revenue, potentially through commercialization of innovations, partnerships, and other financial strategies. The balanced funding mix ensures greater financial resilience and supports sustained growth and development.

Thus, the projected evolution of the ZIA's budget sources underscores a strategic approach to financial planning, ensuring that the agency can adapt to changing funding landscapes as it matures. Initially reliant on government support, the ZIA is expected to progressively attract international funds and develop self-financing capabilities. This strategic diversification is crucial for building a

resilient and sustainable innovation agency that can effectively contribute to Zambia's socio-economic development through sustained innovation and technological advancement.

Considering the evolution of ZIA, proposed operational programs by each team and corresponding required budget amount are shown in Table 3 and the budget estimation for the ZIA including labor cost, program budget, operational and infrastructure cost is shown in Table 4.

[Table 3] Potential programs and corresponding budget required

(unit: 1,000 USD)

Program Details			Foundation Stage		Take-off Stage			Growth Stage			
Team	Program Title	Budget/project	2025	2026	2027	-	2029	2030	-	2035	
R&D Analysis & Planning Team	R&D and Needs Survey	\$10,000	20	20	40		40	50	-	50	
	Technology Roadmap	\$10,000		40			80			120	
	STI Policy Research	\$5,000		10	40		60	70		90	
R&D Activity Support Team	Joint Research Program (public-private)	\$50,000		100	200		300	400		600	
	Mission-Oriented Research Program	(Individual) \$30,000		30	60		90	120		180	
		(Group) \$100,000		100	200		300	400		600	
	International Cooperation Research Program*	(Establishment of Research laboratory) \$30,000				30		60	90		120
		(Joint research) \$30,000				30		60	90		120
Capacity Development Team	Overseas M.A./Ph.D. Support Program	\$30,000									
	Capacity Development Program	(Program Development) \$20,000		20	20			40			
		(Program Operation) \$30,000				30		60	90		120
	I-U-R Exchange Meeting	\$2,000		10	20		20	30		30	
Innovation Financing & Technology Commercialization Team	On-Site Bottleneck Technology Support Program	\$5,000		30	40		60	70		90	
	Technology Commercialisation Support Program	\$10,000		30	40		60	70		90	
	IPR Support Program	\$3,000		9	12		15	18		27	
	Technology Guarantee Program	\$50,000						100		200	
Information Management System Team	STI Information Sharing Platform	\$50,000		50	50		50	50		50	
	National R&D Information Platform	\$200,000						200		100	

External Cooperation Team	Media and PR	\$1,000		1	2		4	4		4
	STI conference	\$10,000			10		20	20		20
<b>Total</b>			<b>20</b>	<b>450</b>	<b>824</b>		<b>1,239</b>	<b>1,912</b>		<b>2,611</b>

\*The allocated budget here is intended to fund domestic innovation actors participating in international ODA projects that support the establishment of research infrastructure or joint research with developing countries. Examples of such ODA programs include Japan's SATREPS<sup>5</sup> (Science and Technology Research Partnership for Sustainable Development) and Korea's Development Cooperation Program<sup>6</sup> by the Ministry of Science and ICT. The Zambian government can adopt a step-by-step approach, starting with establishing research infrastructure in four strategic sectors: agriculture, mining, manufacturing, and tourism. Following this, collaboration projects on joint research in these sectors can be developed. The Output 4.2 funding proposal serves this purpose.

Source: Author's elaboration

[Table 4] Evolution of ZIA and Corresponding Budget Scheme

		Foundation Stage (2025-2026)	Take-off Stage (2027-2029)	Growth Stage (2030 and beyond)
Organizational Structure		6 teams	2 Divisions, 7 teams*	2 Divisions, 7 teams
Manpower		5 ~ 20	28 ~ 40	46 ~ 60
		1 Director 1 Deputy Director 2-3 per team	1 Director 1 Deputy Director 2 Division Chiefs 4-6 per team	1 Director 1 Deputy Director 2 Division Chiefs 7-9 per team
Budget Estimation (USD)	Labor Cost**	27 ~ 72	100 ~ 135	154 ~ 196
	Program Budget	20 ~ 450	824 ~ 1,239	1,912 ~ 2,611
	Operation Cost	50 ~ 100	150 ~ 200	300 ~ 400
	Infrastructure Cost	200	500	700
	Total Amount	297 ~ 822	1,574 ~ 2,074	3,066 ~ 3,907

\*Admin team will be additionally established.

\*\*Director level monthly salary: 1,000, Deputy Director: 500, Division Chief: 400, Entry level: 250

Source: Author's elaboration

<sup>5</sup> Approximate budget is USD 640,000 per year and duration of project is 3 ~5 years.

<sup>6</sup> Approximate budget is USD 360,000 per year and duration of project is 3 years.

### **3. Risk management**

The establishment and effective implementation of the ZIA are contingent upon overcoming four critical challenges: securing strong commitment from top decision-makers, enacting speedy legislation, ensuring adequate budget allocation, and executing effective implementation strategies. Each of these challenges plays a pivotal role in the successful operationalization of the ZIA.

#### **Strong Commitment from Top Decision-Makers**

A fundamental challenge in establishing the ZIA is obtaining strong and unwavering commitment from top decision-makers. This commitment is crucial for driving the agency's agenda and ensuring that innovation and technological advancement are prioritized at the highest levels of government. Such dedication can facilitate the mobilization of resources, the alignment of national policies with the ZIA's objectives, and the fostering of a supportive environment for innovation. Without this high-level commitment, the ZIA may struggle to achieve the necessary influence and support to drive its initiatives effectively.

#### **Speedy Legislation**

The implementation of the ZIA requires the swift enactment of legislation that provides a clear legal framework for its operations. Speedy legislation is essential to establish the agency's mandate, governance structures, and operational guidelines. This legal foundation enables the ZIA to function with authority and clarity, ensuring that its activities are legally sanctioned and supported. Delays in legislative processes can hinder the agency's ability to commence its activities, create uncertainty, and impede progress.

#### **Private Sector Participation**

In addition to the public sector, the private sector brings essential financial resources, expertise, and infrastructure needed to implement innovation activities. Private companies are closely connected to market demands and trends, ensuring that research and innovation efforts align with these

demands. This alignment increases the likelihood of successful commercialization and adoption. Furthermore, the private sector plays a crucial role in commercializing innovation outputs, ensuring the sustainability and scalability of innovation projects.

### **Detailed Implementation Plan**

Effective implementation of the ZIA's strategic plans and programs is critical to achieving its mission of advancing innovation in Zambia. This involves executing detailed operational plans, managing resources efficiently, and continuously monitoring and evaluating progress. Implementation challenges include coordinating among various stakeholders, maintaining operational efficiency, and adapting to emerging challenges and opportunities. Successful implementation requires robust management practices, clear communication channels, and the ability to respond dynamically to the evolving innovation landscape.

Therefore, mitigating these four risks—securing strong commitment from top decision-makers, enacting speedy legislation, promoting participation of private sector, and executing effective implementation strategies—is essential for the successful establishment and operation of the ZIA. Overcoming these challenges will enable the ZIA to foster a thriving innovation ecosystem, drive technological advancements, and contribute significantly to Zambia's socio-economic development. Key measures to mitigate and manage risks are outlined as follows (Table 4):

[Table 5] Risks and Mitigation Measures

Risk Category	Risk Description	Mitigation Action
Organizational	Commitment from top decision-makers	<p><i>Engagement and Advocacy:</i> Hold regular engagement sessions with top decision-makers to demonstrate and showcase the benefits and impact of the ZIA's activities.</p> <p><i>Building a Coalition of Support:</i> Construct a coalition of influential stakeholders, especially from non-government sector such as industry leaders, and international partners, to advocate for the ZIA.</p>
Organizational	Absence of legal foundation	<p><i>Legislative Advocacy:</i> Advocate for the importance and urgency of the legislation to policymakers and legislators through the development of importance of the ZIA, supported by data and case studies to demonstrate the benefits of the ZIA.</p> <p><i>Public Awareness Campaigns:</i> Raise public awareness about the importance of the ZIA and the need for speedy legislation.</p>
Operational	Limited participation by private sector	<p><i>Communication Channels:</i> Holding workshops inviting private sector stakeholders and advocating the activities of the project</p>
Operational	Lack of long-term implementation strategy	<p><i>Establishment of the ZIA's Masterplan:</i> Develop a masterplan with detailed and actionable operational plans that outline specific functions, programs, timelines, and responsibilities.</p> <p><i>Monitoring and Evaluation:</i> Set up a robust monitoring and evaluation system that includes regular progress reports, performance reviews, and impact assessments of the ZIA.</p>

Source: Author's elaboration

## Chapter 4.

# Conclusion

Zambia's national development requires a robust innovation system to address the challenges and opportunities posed by global economic shifts, environmental sustainability, and climate change. Several factors underscore the need for an innovation support agency in Zambia:

- i. **Economic Diversification:** Key sectors such as agriculture, manufacturing, mining, and tourism require modernization and innovation to enhance productivity and competitiveness.
- ii. **Sustainable Development:** Integrating low-carbon technologies and practices is essential for sustainable growth and mitigating the impacts of climate change.
- iii. **Human Resource Development:** Building and sustaining human resource capacities in STI are crucial for driving innovation and development.
- iv. **Global Competitiveness:** Enhancing Zambia's ability to compete in the global market by fostering a culture of innovation and technological advancement.

However, addressing these four challenges—securing strong commitment from top decision-makers, enacting speedy legislation, ensuring adequate budget allocation, and executing effective implementation strategies—is essential for the successful establishment and operation of the ZIA.

To conclude, the concept and plan for the ZIA represent a strategic initiative to harness STI for Zambia's sustainable and climate-resilient development. By fostering innovation, supporting R&D, and strengthening sectoral linkages, the ZIA aims to transform Zambia into a competitive economy that prioritizes low-carbon and sustainable growth. Moreover, the ZIA's establishment

is critical for positioning Zambia as a leader in innovation within the region, capable of addressing both local and global challenges through advanced technological solutions. This strategic focus on innovation will not only drive economic growth but also ensure that Zambia can effectively respond to and capitalize on emerging opportunities in the global market.

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## Appendix I. List of National Innovation System (NIS) Working Group

<b>Affiliation</b>	<b>Position</b>	<b>Name</b>
Ministry of Technology and Science	Assistant Director	Mwenya Mulenga
Ministry of Technology and Science	Senior Science Officer	Mwansa Chilambwe
National Technology Business Centre	Acting Director	Innocent Mandona
National Science and Technology Council	Programme Officer	Nsama Mataka
Zambia Agricultural Research Institute	Officer	Mwape Mumba
National Remote Sensing Centre	Researcher	Michael Phiri
Zambia Environmental Management Agency	Officer	Tibale Ngwata
Jacaranda Hub	Officer	Phyllis Mayi
University of Zambia (TDAU)	Manager	Leonard Simukoko
Ministry of Green Economy and Environment	Principal Officer	Phillipa Hamakasu
Ministry of Agriculture	Principal Officer	Joseph Cheelo
Natural Resources Development College	Lecturer	Rabson Banda
Ministry of Green Economy and Environment	Climate Change Mitigation Officer	Frank Gwaba

## Appendix II. Individual AHP Responses on Resulting Priorities of ZIA's Functions

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