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

Schemes to Enhance Innovation Capacity

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Chapter 1. Introduction

1. Background

Zambia is a landlocked and developing nation that spans 752,614 km² total area coverage. Zambia's economy grew at one of the fastest growing rates in Africa during the first ten years of the 21st and the country attained middle-income status in 2011.[1]Nevertheless, the economy of Zambia has stagnated in recent years as a result of energy problems, large budget deficits and falling copper prices. Like most countries of Sub-Saharan Africa, Zambia has a dual sector economy where the traditional subsistence sector dominated by agriculture and animal husbandry employs the majority of population in rural areas and where a modern market-oriented sectors such as mining, manufacturing, energy and transport employing a smaller proportion of population generates most of tax revenues and foreign exchange.

In the face of increasing environmental challenges and economic dependency on agriculture and mining, Zambia is embarking on a transformational journey toward climate resilience and sustainable economic growth. Establishing the Zambia Innovation Agency (ZIA) will represent a pivotal step in this direction. ZIA will act as the national focal point for fostering innovation, driving low-carbon technologies, and enhancing innovation capacity across agriculture, manufacturing, and energy sectors.

Drawing upon global best practices, including key examples from Korea and other international case studies, this report presents strategic recommendations for the Zambia Innovation Agency (ZIA) to catalyse climate-resilient economic growth. The focus areas include capacity building, strategic communication, and the concept development of a web-based platform to enable impactful innovation.

[1] Central Statistical Office of Zambia

2. Zambia’s Vulnerability to Climate Extreme

Zambia is highly vulnerable to climate change due to its reliance on agriculture, natural resources and a growing population. The heavy reliance on a few sectors makes the country’s economy vulnerable to climate related shocks. Zambia's GDP is mostly derived from agriculture, which also employs a sizable section of the labor force. Crop production and food security are impacted by the unpredictable rainfall patterns, droughts and floods brought on by climate related shocks. Besides, Zambia's water resources including rivers and lakes are crucial for drinking water, agriculture and hydropower.

However, changing rainfall patterns can lead to water scarcity for domestic consumption and hydroelectric power generations as well as water surplus that generates flooding resulted from climate changes, impacting agriculture and energy production in Zambia. Moreover, climate change intensifies health challenges, such as heat-related illnesses and the spread of vetor-borne diseases. Additionally, its impacts on biodiversity and forest resources-essential for sustaining livelihood and ensuring carbon sequestration-underscore the urgent need for adaptive strategies.

To tackle this climate related critical challenges and shocks, the Government of the Zambia launched the “National Green Growth Strategy” 2024-2030 on the 24 April 2024, a landmark initiative aimed at transitioning the nation towards a green economy by fostering low-carbon emission, resource-efficient, resilient and socially inclusive growth.

The National Green Growth Strategy of Zambia represents a landmark initiative aimed at transitioning the nation towards a green economy. It is a comprehensive framework designed to align Zambia's development pathways with principles of sustainability and inclusivity centering on four pillars: 1) resilient and climate-compatible growth, 2) enhanced resource efficiency, 3) enhanced natural capital and 4) improved inclusivity. Additionally, it provides a roadmap for achieving Zambia's Vision 2030 and the 8th National Development Plan of the country’s objectives, while reaffirming Zambia's commitment to the Paris Agreement, the Sustainable Development Goals and the Convention on Biological Diversity. Zambia has implemented this strategy not only as a pathway to sustainable growth but also to address the needs of its population amidst escalating climate change impacts.

3. Methodology and Process for Development

By fostering innovation and resilience, communities can more effectively adapt to the challenges of climate change. The proposed methodology shall be considered a participatory approach, ensuring that the voices of all stakeholders are heard and integrated into the innovation communication and capacity-building processes. Accordingly, the proposed methodology and process of ZIA's innovation communication and capacity-building strategy in climate resilience, along with the development of a web-platform concept encompasses the following key steps.

3.1. Reviewing of International Cases

To inform the development of ZIA's programs, case studies from Korea-including KIRD (Korea Institute of Human Resource Development in Science and Technology), KISTI (Korea Institute of Science and Technology Information), and KOFAC (Korea Foundation for the Advancement of Science and Creativity) from Korea- as well as examples from Africa, such as the Climate Action Innovation Hub, the South African Climate Action Network (SACAN), the Kenya Climate Innovation Center (KCIC), and the Ghana Climate Innovation Hub (GCIH), have been incorporated. These institutions were selected based on their proven success in fostering innovation, enhancing human capacity in science and technology, and raising public awareness of STI-factors critical to achieving Zambia's economic and environmental objectives.

3.2. Stakeholder Engagement and Opinion Collection

Key stakeholders in Zambia, including government officials, industry leaders, researchers, local communities were engaged through a series of workshops and consultative meetings to gather stakeholders' innovation communication, capacity building priorities, and climate resilience requirements. Insights were collected during in-country workshop held in Lusaka, as well as through virtual consultation sessions. Additionally, a delegation of Zambian stakeholders visited Korea to observe and learn from leading institutions, gaining exposure to their operational models and best practices in technological innovation and capacity building. These workshops allowed participants to contribute their insights into how ZIA's can adapt these models to its own national innovation communication systems and capacity building strategy

to achieve climate resilient and economic development program.

3.3. Research and Benchmarking

This component is benchmarking international case studies from Korea and other African countries as well as addressing key innovation support frameworks and strategies mainly from Korean STI support institutions to inform ZIA's approach.

3.4. Study Mission

The coordinated study mission is focused on Korea for Zambian delegates to gain understanding of operational models and capacity-building initiatives of Korean institutions.

3.5. Strategy and Concept Development

This strategy and concept shall be developed for ZIA's innovation communication and capacity-building strategy, alongside the concept of a web-based platform, based on stakeholder input and international case study analysis. In general, this process ensures that the development of ZIA's innovation communication strategy, capacity-building framework, and online platform concept is not only informed by global best practices but also tailored to meet the specific needs and priorities identified by different local stakeholders in Zambia. By adopting this approach, ZIA will be well-positioned to lead Zambia's transition towards a climate-resilient, low-carbon emission economic development initiative, with innovation at the core of its strategic initiatives.

Chapter 2.
Case Studies on the Development of Innovation Communication and Capacity Building Strategy

1. Outline

Climate change is real and has been responsible for disasters, destruction and deaths in the world where Africa being mainly vulnerable to its adverse impacts. There are prolonged and intensified droughts in eastern Africa, unprecedented floods in western Africa, depletion of rain forests in equatorial Africa and an increase in ocean acidity around Africa's southern coast. Significantly altered weather patterns and climate extremes threaten agricultural production and food security, health, water and energy security limiting Africa's ability to grow and develop. Climate change induced disasters aggravate forced migration and produce competition among communities and nations for water and basic needs resources, with potential negative consequences for political stability and conflict resolution[2].

Climate change is one of the largest risk multipliers for the people, environment and stability of the African continent. Temperatures in Africa are projected to rise faster than the global average during the 21st century. The extreme temperatures are expected to be increased today's level by 2°C where this projection raise to 4°C to 6°C by the end of the 21st century in tropical western Africa and the Sahel region.[3] On the other hand, future rainfall regime indicate that southern Africa will become drier, and eastern and western Africa will become wetter, with more intense rain and increased risk of floods[4]. Therefore, understanding the impacts of climate change on development priorities in Africa and adapting economies, societies, natural resource management practices, energy investments, budgets and policies to its expected and uncertain consequences, is crucial in the pursuit of sustainable development and improved climate

[2]Climate Change in Africa: Adaptation, Mitigation and Governance Challenges
[3]African Union (2022). African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032)
[4]Climate Change Adaptation in Africa: UNDP Synthesis of Experiences and Recommendations 2000-2015

governance. The United Nations' Sustainable Development Goals (SDGs) include SDG 13: Climate Action, which outlines specific measures that can be taken to mitigate and adapt to climate change issues with long-lasting effects on the earth's sustainability. The target achievement goal for these actions is set for 2030.

Besides, the Africa Union's Agenda 2063 makes it clear that climate-resilient communities and economies are an integral component of the continental vision for an integrated, prosperous and peaceful Africa, driven by its own citizens, representing a dynamic force in the international arena. This African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) supports the realization of this vision by setting out principles, priorities, and action areas for enhanced climate cooperation and long-term, climate-resilient development.

As a result, there is an urgent need to center climate adaptation in conservation policy and practice and for adaptation responses to be bolder and more innovative. Innovation communication and capacity-building strategy addresses this need by promoting creativity and innovation in climate adaptation for biodiversity and ecosystem conservation[5]. The guide is not about promoting innovation for the sake of innovation; rather, it is intended to help policymakers, researchers, and resource managers harness the power of innovation to achieve more effective adaptation outcomes.

Innovation communication and capacity building can be considered to have three key attributes-novelty, value and process. They depend on creativity, insight, and inspiration, as well as a willingness to experiment, test assumptions, and learn from failure. Just as climate adaptation can be thought of as a process not an endpoint, successful innovation typically results from an intentional and iterative process.

In general, addressing these challenges of climate change requires effective innovation communication and capacity building strategies that empower communities, governments and organizations to innovate and implement sustainable solutions. Besides, setting goals, stakeholder engagement, education and awareness, capacity building, policy development and

[5]Olalekan John Okesanya et al. (2024). Introducing African-led Innovation to tackle the challenges of climate change in Africa. PAMJ - One Health. 2024;13(2). 10.11604/pamj-oh.2024.13.2.41492.

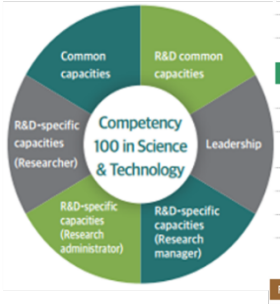
monitoring and evaluation are some of the basic components of innovation communication and capacity-building strategies. The following sections outlines innovation communication and capacity building experience implemented by different countries to manage climate resilient and green economic development strategies.

2. Korea Institute of Human Resource Development in Science and Technology (KIRD)

KIRD, established in 2007, is dedicated to advancing human capital in science and technology through targeted training and capacity-building initiatives. The organization strategically develops and delivers structured training modules designed to cater to professionals at various career stages, ranging from entry-level researchers to senior executives.

KIRD's core mandate encompasses the provision of comprehensive R&D training programs, the development of both online and in-person educational resources, and the facilitation of leadership development pathways. A cornerstone of KIRD's offerings is its extensive training portfolio anchored in the *Top 100 Competencies in Science and Technology*. This competency framework is meticulously structured, categorized, and disseminated through blended learning formats, ensuring targeted skill enhancement across diverse sectors.

[Figure 2-1] KIRD: Competency 100 in S&T



Common Capacities				R&D Common Capacities			
C1	Specialty	C7	Convergent training skills	RF1	Data analysis	RF6	Intellectual curiosity
C2	Sense of responsibility	C8	Ethics	RF2	Document processing skills	RF7	Strategic thinking
C3	Communication skills	C9	Global mindset	RF3	Statistics skills	RF8	Insight
C4	Promotion focus	C10	Learning agility	RF4	Planning skills	RF9	Resource management
C5	Creativity	C11	Metacognition	RF5	Execution skills	RF10	Digital literacy
C6	Teamwork						
R&D Specific Capacities (Researcher)							
RR1	Science technology policy analysis	RR7	Outcome utilization planning	RR13	Research data utilization	RR19	Technology marketing
RR2	Research development trend analysis	RR8	Technology roadmap establishment	RR14	Public communication	RR20	Technology commercialization
RR3	Technology demand analysis	RR9	Research report writing	RR15	Research data visualization	RR21	Post-research management
RR4	Task planning skills	RR10	Research schedule management	RR16	Performance evaluation response		
RR5	Project feasibility analysis	RR11	Research project resource management	RR17	Evaluation feedback		
RR6	Research planning	RR12	Research management	RR18	Technology value evaluation		
R&D Specific Capacities (Research administrator)							
RA1	Management strategy planning	RA8	Performance analysis	RA15	Tax management	RA22	HR evaluation
RA2	International cooperation project management	RA9	Performance management	RA16	Purchase strategy planning	RA23	Training
RA3	Selection and contract completion of research project	RA10	Post management of technology transfer/commercialization	RA17	Purchase contract	RA24	Payment management
RA4	Research project execution management	RA11	Budget planning and execution	RA18	Purchase quality management	RA25	Well-fare program management
RA5	R&D performance evaluation response	RA12	Budget allocation execution	RA19	Asset acquisition	RA26	Labor management
RA6	Promotion planning	RA13	Accounting	RA20	HR planning		
RA7	Promotional event organization and management	RA14	Settlement management	RA21	Recruitment		
R&D specific capacities (Research manager)							
RM1	Policy direction strategy	RM5	Resource allocation planning	RM9	MOU management	RM13	Outcome utilization planning
RM2	Project planning	RM6	RFP	RM10	Execution management and site audit	RM14	R&D outcome utilization analysis
RM3	Project feasibility analysis	RM7	Evaluation group organization and management	RM11	Research project evaluation	RM15	R&D performance management
RM4	Technology trend analysis	RM8	Project promotion and evaluation	RM12	R&D expense settlement	RM16	Policy improvement and legislation
Leadership2							
L1	Vision sharing	L5	Goal management	L9	Coaching	L12	Understanding organization
L2	Innovation management	L6	Change management	L10	Self-management	L13	Self-directed learning
L3	Organization management	L7	Motivation	L11	Leading by example	L15	Problem solving
L4	Research decision making	L8	Delegaton	L12	Cooperation	L16	Career development

Source: KIRD (2023), “2023 KIRD Training Programs”, p. 21.

The competency architecture within KIRD’s framework is systematically divided into three principal domains. The first domain, Common Capacities, encompasses foundational skills that are universally applicable across the entire R&D value chain. These competencies are designed to strengthen interdisciplinary capabilities, fostering the operational excellence necessary for sustained growth and innovation.

The second domain, R&D-Specific Capacities, comprises tailored training modules that address the distinct and evolving needs of researchers, administrators, and R&D managers. These programs emphasize critical areas such as performance analytics, efficient resource allocation, and the strategic planning of research initiatives, ensuring that professionals are equipped to optimize project outcomes and drive innovation.

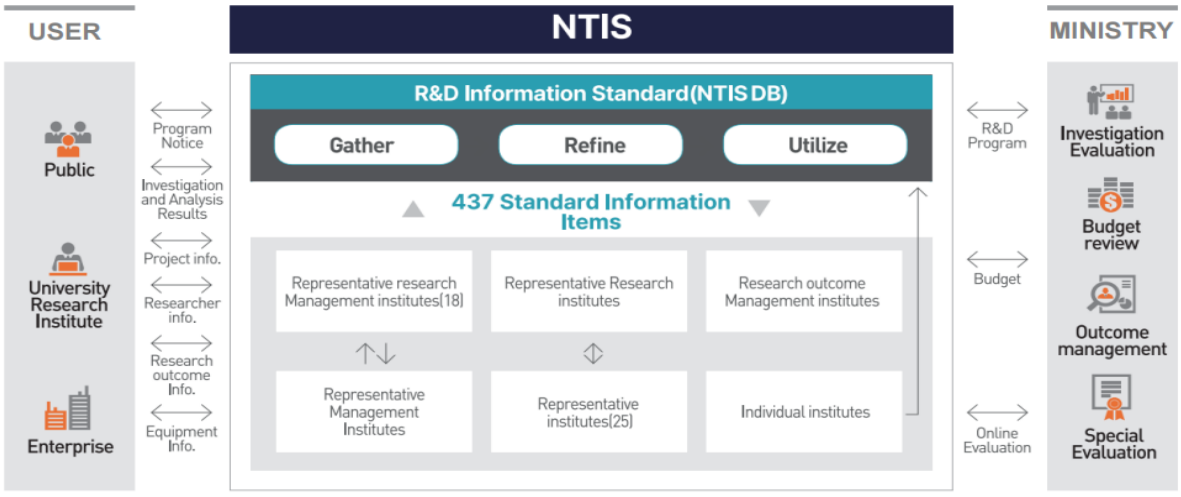
The third domain, Leadership Competences. Focuses on cultivating advanced leadership skills essential for guiding teams and organizations within the science and technology sectors. This domain highlights the development of strategic delegation abilities, enhances decision-making proficiency, and reinforce performance governance, enabling leaders to effectively manage complex R&D environments and achieve organizational objectives.

By adopting this structured, competency-based paradigm, KIRD empowers institutions to strengthen human capital pipelines, enhance research productivity, and catalyse innovation ecosystems. This holistic model serves as a scalable blueprint for organizations seeking to establish resilient R&D infrastructures and drive long-term, sustainable innovation.

3. Korea Institute of Science and Technology Information (KISTI)

KISTI, founded in 1962, serves as Korea's national information repository for science and technology. It provides decision-makers and innovators with critical R&D data, fostering collaboration across sectors. KISTI's National Science & Technology System (NTIS) and its extensive data management platforms can be an exemplary model for ZIA's digital initiatives. Figure 2.2 illustrates the information service flow of NTIS, a comprehensive platform for managing R&D information.

[Figure 2-2] KISTI: NTIS Service Flow



Source: KISTI (2023), *National R&D Management in Korea*. Cambodia Workshop material. March 28, 2023, p.8.

NTIS operates by gathering, refining, and utilizing R&D data based on a standardized framework consisting of 437 information items. It serves multiple stakeholders, including the public, universities, research institutes, and enterprises, facilitating access to project information, research outcomes, and equipment details. The key functions of the information system include:

Gathering and Standardization: NTIS collects R&D data from representative research management institutes, research outcome management institutes, and individual institutions,

ensuring consistency and quality.

Refinement: The platform processes the collected data to make it usable for various stakeholders, including government ministries responsible for R&D program evaluation, budget reviews, and outcome management.

Utilization*:* Users, such as public entities, research institutes, and enterprises, access tailored information through NTIS for program notice, analysis, and project outcomes.

Ministries leverage the platform for R&D program management and budgetary and special evaluations, ensuring data-driven decision-making processes. NTIS is designed to streamline the flow of R&D information, improving transparency, efficiency, and collaboration across the science and technology ecosystem. This integrated approach enhances cross-sector communication and supports evidence-based policy-making and resource allocation, which is crucial for fostering innovation and maximizing R&D impact.

4. Korea Foundation for the Advancement of Science and Creativity (KOFAC)

KOFAC traces its origin back to 1967, established as the Korea Science and Technology Promotion Foundation. Its original mission was to promote science and technology education and increase public interest in these fields. Over time, as Korea's economy and technological landscape evolved, the foundation expanded its scope to include creativity and innovation as key drivers of scientific advancement.

In 2008, the organization was rebranded as KOFAC, with an enhanced focus on promoting STEM education, fostering public engagement with science and technology, and enhancing science literacy nationwide. KOFAC now plays a leading role in hosting science festivals, organizing educational programs, and creating public exhibitions to increase public understanding of science and technology. The evolution of KOFAC serves as a model for other countries looking to build similar institutions that promote scientific literacy and innovation on a broad societal level. The key roles of the system include organizing annual science festivals and exhibitions, implementing programs that foster creative talent in science, engineering and innovation, and collaborating with schools to enhance science and technology education.

5. Climate Action Innovation Hub of Africa

The Africa Climate Summit (ACS) marked a key moment for African Union (AU) member states to come together to develop and promote a common climate agenda for the continent. The key discussion agenda includes resilience building to enhance African livelihoods, the need for accelerated finance to support adaptation and loss and damage, a call to reform international financial architecture, and support for energy transitions of African countries. The theme of the ACS was *'Driving green growth and climate finance solutions for Africa and the world'*.

The Innovation Hub was a key part of the ACS event agenda. It was a unique space dedicated to African innovators, especially women and youth, to showcase their 'game-changing' climate solutions and project ideas supporting achieving a climate-resilient and sustainable Africa. In response to these challenges and the need to highlight and amplify local-level action, the Innovation Hub at the ACS offered a platform to showcase the remarkable climate innovations happening across the continent. It brought together leaders, innovators, and stakeholders to celebrate African ingenuity in the face of climate change. The Innovation Hub showcased homegrown innovations designed to enhance climate resilience across the continent and speed up the delivery and implementation of the AU's Climate Strategy.

The innovation hub is designed to achieve four key sub-objectives aimed at addressing climate change and fostering sustainable development in Africa.

First, it focuses on strengthening the adaptive capacity of communities most affected by climate change, ensuring they can effectively manage and mitigate associated risks. Additionally, the hub seeks to promote equitable and transformative pathways for low-emission, climate-resilient development, emphasizing inclusive growth and long-term sustainability.

Another critical objective is to enhance Africa's ability to mobilize resources and expand access to and development of technologies that support ambitious climate action. By fostering innovation and collaboration, the hub aims to drive technological advancements and capacity-building efforts across the continent.

Finally, the innovation hub prioritizes enhancing inclusion, alignment, cooperation, and ownership of climate strategies, policies, programs, and plans. This involves fostering stronger collaboration across all levels of government and diverse stakeholder groups, ensuring cohesive and integrated approaches to climate governance and action.

The diverse innovations that were selected included, but were not limited to, clean energy, CSA and sustainable land management, biodiversity conservation, green economy and sustainable value chains, sustainable fisheries management, water storage and conservation, waste management and circular economy, green transport, climate-resilient infrastructure, resilient, climate smart cities, and digital transformation.

6. The South African Climate Action Innovation Hub of Africa

SACAN is a coalition of civil society organizations focused on addressing climate change in South Africa. By fostering a collaborative approach, SACAN aims to create a more resilient and sustainable future for South Africa in the face of climate change. It emphasizes the importance of communication in mobilizing communities and advocating for policy change. SACAN aims to influence policy and decision-making to promote climate justice and sustainable development.

The network fosters collaboration among various stakeholders, including NGOs, community groups, and government entities. Conducting research and raising awareness about climate change impacts and solutions and providing training and resources to empower communities and organizations to engage in climate action are the main activities of the main activity of the SACAN. Besides, climate change mitigation, adaptation and policy engagement area the major focus areas of SACAN.

7. Ghana Climate Innovation Hub (GCIH)

The Ghana Climate Innovation Hub (GCIH) is an initiative aimed at fostering innovation and entrepreneurship in the realm of climate change and environmental sustainability. It serves as a platform for startups, researchers and organizations to collaborate on solutions that address climate-related challenges in Ghana and beyond. The key features of GCIH are innovation support, networking opportunities, capacity building, research and development, research and development, research and development and policy advocacy. On the other hand, addressing the issues of renewable energy, waste management, sustainable agriculture, water resource management and climate resilience strategies are the focus areas of the GCIH.

In general, GCIH plays a critical role in empowering local communities and businesses to adopt practices that contribute to a sustainable future while addressing the urgent challenges posed

by climate change.

Chapter 3. Concept Development of Innovation Communication and Capacity Building Strategy and Plan

1. Outline

Zambia aspired to shift its economy from a heavily reliance on agriculture and mining toward a more diversified as well as innovation, technology and knowledge-based service provision models. In this transition, Zambia can draw valuable lessons from other developed countries' successful experience in establishing institutional frameworks that drive innovation, capacity-building and effective information communication using digital platforms for informed decision-making processes. By understanding how other institutions in different countries have achieved this, the Zambia Innovation Agency (ZIA) can adopt and tailor similar approaches to support climate resilience and sustainable economic growth.

In Zambia, climate change and variability have grown to be a serious challenge to the sustainable development of the country. The nation is already dealing with climate-related risks such as prolonged dry spells and droughts, flash floods and seasonal flooding and extremely high and low temperatures. The frequency and severity of some of these hazards, particularly the floods and droughts, have grown over the past few decades, negatively affecting people's ability to get food and water as well as the quality of their water, energy and livelihoods, particularly in rural areas. Innovation approach for climate resilient is seen as a relevant tool with a double benefit, to respond to the adverse impacts of climate change and to generate economic growth. As a structured approach to fostering innovation is required, the concept of Innovation Communication Systems and capacity building to enhance climate resilient economic development has been introduced and widely adopted.

Zambia has communicated clear ambitions of fostering innovation and aspires to become a prosperous low carbon and climate resilient middle-income country by 2030 as enshrined in its Vision 2030. However, to date, most initiatives to increase its innovative capacities were uncoordinated and with limited success. Economic development strategy in Zambia is helpful for fostering innovation communication system and capacity building as well as developing platforms used to serve communicate information about climate resilient economic

development through innovation communication and capacity building strategies across institutions and industries. Besides, formulating and implementing the ZIA's Innovation Communication Systems and Capacity Building adaption strategy is important to tackle the country's climate change vulnerabilities, which requires a comprehensive approach that includes improving agricultural practices, enhancing water management, investing in renewable energy sources and promoting health resilience.

Zambia's low carbon emission and green growth economic resilience strategy will focus on balancing economic growth with environmental sustainability as well as promoting sustainable development while addressing climate change.

In general, the climate resilient Innovation Communication Systems and Capacity Building roadmap should be focused on low carbon emission and green growth economic development of Zambia considering renewable energy, sustainable agriculture, forest conservation and community engagement. This calls for a comprehensive approach that includes boosting health resilience, investing in renewable energy sources, improving water management and upgrading agricultural practices. By then, Zambia will be planned to create a resilient economy that promotes social and economic well-being while reducing the effects of climate change through the implementation of the innovation communication System and capacity building program.

Thus, climate resilient innovation and technological approaches are essential for enhancing sustainable economic development in Zambia. By leveraging innovation and technology, fostering collaboration and creating supportive policy environment, Zambia can build a more climate resilient economy that addresses the challenges of climate change while improving livelihoods and promoting sustainable practices. By then, Zambia hopes to create a climate resilient economy that reduces the effects of climate change while fostering social and economic well-being through the implementation of the national innovation communication and capacity building systems strategy.

This chapter outlines a strategy for innovation communication and capacity building for ZIA, drawing on successful Korean and African countries models. The proposed strategy aims to strengthen Zambia's innovation ecosystem by promoting collaboration among stakeholders, developing human capital in science, innovation and technology and integrating digital platforms for efficient communication.

The relevance of Korean and other African countries innovation institutions lies in their focus on areas critical to Zambia's development, including:

- **Capacity Building**: Equipping the STI workforce with the skills necessary for

innovation and technology adoption.

- **Stakeholder Identification and Analysis**: Identifying and categorizing stakeholders into different layers for fostering a collaborative and inclusive innovation ecosystem.
- *Information Management*: Establishing national repositories of data to support informed decision making and collaboration.
- **Public Engagement**: Raising public awareness and engagement with science and technology to nurture a culture of innovation

Korea's and African countries' experience offer practical models that Zambia can adapt to its local context, particularly as it seeks to build a low-carbon emission and climate-resilient economy. By implementing structured capacity-building initiatives, creating data management systems and digital platform dashboards, and fostering public engagement, Zambia can leverage innovative ecosystems to enhance its global competitiveness and climate adaptation efforts.

Drawing on the experiences of Korean and other African innovation institutions and incorporating feedback from key Zambian stakeholders, we propose the following strategy to guide ZIA's innovation communication and capacity-building efforts.

2. Goal Setting and Local Adaptation

Setting goals for local adaptation to climate change is essential for fostering resilience and ensuring sustainable development. Effective goal setting and local adaptation require a comprehensive understanding of a community's unique challenges, collaborative planning, and continuous engagement. By setting goals and local adaptation strategies, communities can build resilience and proactively address climate change impacts.

Objectives

To create a proactive and adaptive approach to climate change for empowering communities to thrive despite the challenges presented by a changing climate.

Key Actions

Foster Stakeholder Collaboration: Strengthen communication and collaboration between key stakeholders, including policy makers, researchers, innovators, youth, women, academia,

private sector and civil society, to drive innovation and align efforts toward climate resilience and sustainable development.

Build Innovation Capacity: Develop and implement capacity-building programs that enhance the skills and expertise of researchers, entrepreneurs and innovation managers, with a focus on climate-friendly technologies and sustainable business models.

Facilitate Knowledge Sharing and Data Management: Establish a national digital platform to streamline the collection, management and dissemination of R&D information, enabling informed decision-making and fostering collaboration across innovation projects.

Support Inclusive and Grassroots Innovation: Encourage and support community-led and grassroots innovation initiatives, ensuring that local businesses and entrepreneurs have access to the technical advice, funding, and networks needed to scale climate innovation projects. These objectives will guide ZIA in building a more resilient and competitive innovation ecosystem, driving sustainable growth, and addressing climate challenges through innovation and collaboration.

3. Stakeholder Mapping and Analysis

Stakeholder identification and analysis are crucial steps in developing effective innovation communication and capacity-building strategies for local adaptation to climate change. Effective stakeholder identification and analysis enable communities to engage relevant parties in climate adaptation initiatives, ensuring that diverse perspectives are considered and strategies are well-informed and supported. This collaborative approach enhances the likelihood of successful adaptation outcomes.

Objective

To drive innovation and capacity building effectively, ZIA will need to identify and categorize its stakeholders into primary, secondary, and tertiary groups, each playing a vital role in fostering a collaborative and inclusive innovation ecosystem.

Primary Stakeholders: This could be consisting of government agencies and ministries. Key government bodies responsible for policy formulation, funding and regulatory oversight are critical to ZIA's innovation agenda. These may include Ministry of Higher Education, Ministry of Science and Technology, Ministry of Finance and Ministry of Environment and Natural

Resources. These stakeholders provide necessary policy framework, funding mechanisms and governance structures that enable ZIA to achieve its objectives. They are also instrumental in aligning national innovation strategies with Zambia's Vision 2030 and climate resilience.

Secondary Stakeholders: Research Institutes and Universities in Zambia can be clustered in this category. Academic and research bodies such as the University of Zambia and other national research institutes drive innovation through research and development, technology transfer, and knowledge dissemination. These institutions contribute to developing innovative technologies, conducting critical research, and providing technical expertise. Their participation ensures that ZIA's projects are based on sound scientific principles and are aligned with global innovation trends. Besides, private sectors and industry players such as corporations, SMEs, and start-ups, particularly those involved in renewable energy, agriculture, mining, and information technology, are key partners in implementing and scaling innovative solutions. The private sector drives commercialization and brings innovations from research to market. Their involvement is crucial for ensuring that innovations are scalable, economically viable, and relevant to market needs.

Tertiary Stakeholders: Local Communities and Civil Society Organizations (CSOs) can be clustered in this layer. Grassroots organizations, NGOs, and community leaders represent the interest of local populations, particularly in rural areas that stand to benefit the most from climate-resilient innovations. Local communities provide on-the-ground insights and feedback on how innovations impact their livelihoods. On top of that, International Development Partners and Donor Agencies such as the World Bank, UNDP, and other bilateral and multilateral institutions provide technical assistance, funding, and best-practice knowledge transfer. These stakeholders are essential for securing financial and technical support for large-scale innovation initiatives.

By mapping and actively engaging these stakeholders, ZIA can build a robust innovation ecosystem that fosters collaboration across sectors, enhances knowledge transfer, and ensures that innovations are inclusive, scalable, and aligned with Zambia's long-term goals for climate resilience and economic growth.

4. Innovation Communication Strategy

ZIA can leverage digital platforms, public exhibitions, and educational programs to drive public engagement in science, innovation and technology. These activities will build a national

culture of innovation, emphasizing the importance of sustainability and climate resilience. ZIA's innovation communication strategy will align stakeholders, ensure information flow, and create a platform for collaboration and innovation. By implementing multi-channel, inclusive communication approach, ZIA will raise public awareness of Zambia's innovation efforts and engage local and international partners in collaboration. This will help Zambia transition toward a knowledge-based, climate-resilient economy.

Objective

To develop a comprehensive and effective communication strategy that ensures all stakeholders-government agencies, researchers, private sector, local communities and international partners- are informed, engaged and aligned with Zambia's national innovation goals particularly in driving climate resilience and sustainable economic development.

Key Actions

Multi-Channel Communication Approach

Digital Platforms: ZIA plans to utilize its online platform as a central hub for information sharing, providing updates on innovation projects, policy developments, funding opportunities, and upcoming events, along with research outputs and success stories.

Traditional Media: Utilize print, radio and television to reach a broad spectrum of audiences, ensuring that innovation messaging is accessible to all, including underserved and rural populations.

Newsletters and Reports: Regularly distribute newsletters and reports to key stakeholders, including government agencies, industry leaders, and academic institutions. These will contain insights on innovation progress, emerging opportunities, and upcoming events.

Webinars and Workshops: Organize both virtual and in-person workshops, webinars, and forums to facilitate knowledge exchange and collaboration among diverse stakeholders.

Knowledge Sharing and Best Practice Dissemination

Case Studies and Success Stories: Highlight Zambia's leading innovation initiatives, focusing on those that contribute to climate resilience, sustainable growth, and social impact. These stories will inspire further innovation and provide replicable models for other stakeholders.

Research and Data Sharing: ZIA will promote the dissemination of research findings through

a dedicated section on its platform, where users can access reports, policy briefs, and data relevant to Zambia's innovation ecosystem.

Tailored Stakeholder Engagement

For Policymakers: Provide concise policy briefs, data insights, and evidence-based recommendations to support decision-making aligned with Zambia's Vision 2030 and climate goals.

For Researchers and Innovators: Create collaboration platforms such as research forums, innovation workshops, and digital knowledge repositories to facilitate dialogue between academia, industry, and government

For Local Communities: Use community-based media and grassroots organizations to educate the public about innovation initiatives, particularly those that impact their daily lives, and promote local participation in innovation projects

Public Engagement and Awareness Initiatives: It is recommended to organize Innovation Fairs and Science Exhibitions, raise awareness of science, technology, and innovation, and create educational campaigns targeting schools, universities, and local communities to foster a culture of innovation and sustainability in Zambia

5. Capacity-Building and Training Programs

Capacity-building and training programs are vital for equipping communities with the necessary skills and knowledge to adapt to climate change. By focusing on local needs, engaging relevant stakeholders, and ensuring sustainable practices, these programs can significantly enhance community resilience and empowerment.

Objective

To build a resilient community capable of effectively responding to climate change challenges.

Key Actions

Professional Training Programs: Develop specialized training programs in key areas such as climate change technologies, green innovation, data science, and advanced manufacturing. These programs should be offered both online and in-person to maximize accessibility.

Leadership Development: Provide leadership training for policymakers, entrepreneurs, and

researchers to build innovation champions within Zambia who can drive change in their respective fields.

Professional Development Programs: This component will address the following issues.

Curriculum Design: Develop and implement competency-based training modules tailored to critical sectors such as climate resilience technologies, green innovation, data science, artificial intelligence, and advanced manufacturing. These programs should be aligned with international best practices and tailored to Zambia's specific development context.

Delivery Mechanisms: Leverage a blended learning approach by offering both synchronous and asynchronous online courses, complemented by in-person workshops and hands-on training. This approach will increase scalability and accessibility, allowing participants from diverse geographic regions and backgrounds to engage.

Certification and Accreditation: Partner with recognized regional and global institutions to offer certifications that meet international standards, enhancing the credibility and employability of Zambian professionals in STI fields.

Leadership and Change Management Training: The following important points shall be considered in this component.

Executive Training for Policymakers: Design leadership development programs that equip senior government officials with the strategic foresight and innovation management skills to lead STI policy reform. These programs will focus on evidence-based decision-making, cross-sector collaboration, and the use of emerging technologies in governance.

Entrepreneurial Leadership Development: Provide high-impact training programs for entrepreneurs and startup leaders, focusing on innovation-driven enterprises (IDEs). Emphasize the development of business models that leverage technological advances, ensuring scalability and sustainability.

Research Leadership Capacity: Equip researchers and academic leaders with advanced skills in research commercialization, intellectual property management, and collaborative R&D practices. Encourage the creation of innovation ecosystems that foster public-private partnerships and technology transfer.

Monitoring, Evaluation and Reporting (MER): Integrating robust MER frameworks into all capacity-building initiatives to measure learning outcomes, knowledge transfer, and the impact on Zambia's STI ecosystem.

Sustainability and Localization: Ensure the programs are sustainable by fostering local ownership and capacity to continue operations post-program completion. This includes training

local trainers (Train-the-Trainer model) and building local institutions' ability to independently adapt and implement similar capacity-building initiatives.

These initiatives aim to systematically enhance Zambia's STI capacity by equipping key stakeholders with the skills, knowledge, and leadership required to navigate and harness emerging technological trends. This will ultimately contribute to national economic growth and competitiveness in the global innovation landscape.

6. Monitoring and Evaluation

Monitoring and evaluation (M&E) for innovation communication are critical components of capacity-building and training programs for climate resilience. They ensure that programs are effective, relevant, and able to adapt over time. A robust monitoring and evaluation framework not only measures the effectiveness of capacity-building and training programs but also provides valuable insights for continuous improvement. By systematically collecting, analyzing, and using data, communities can enhance their climate resilience efforts and ensure sustainable outcomes.

Objective:

To implement a robust monitoring and evaluation (M&E) system to track the progress of innovation communication and capacity-building programs and ensure continuous improvement.

Key Actions:

Performance Metrics: Define key performance indicators (KPIs) to measure the success of communication and capacity-building initiatives. These may include the number of training participants, new innovations commercialized, stakeholder engagement levels, and the success rate of funded projects.

Regular Reporting: Establish a system for regular reporting on the progress of innovation programs. This will involve quarterly or annual updates to ZIA's leadership and stakeholders on the outcomes of innovation initiatives.

7. Stakeholder Collaboration and Public Engagement

Objective:

To promote public awareness and involvement in Zambia's innovation efforts, ensuring that citizens understand the importance of innovation and are actively engaged in the process.

Key Actions:

Public Campaigns: Launch national campaigns that promote the value of science, technology, and innovation in achieving Zambia's development goals. These campaigns could involve media outreach, school programs, and community-based initiatives.

Citizen Science Initiatives: Engage the public in innovation through citizen science projects, where individuals can contribute to research and innovation efforts in their local communities.

8. Key Performance Indicators (KPIs) for Implementing the Strategy

These KPIs equip the innovation communication system and capacity building STI workforce with the necessary skills for innovation and technology adoption. By tracking the following KPIs, we can assess the STI capacity-building initiatives' effectiveness and identify improvement areas.

[Table 3-1] KPS for Implementing the Strategy: Strategic Pillars and Indicators

Strategy Pillars	Indicators
Capacity Building and Training	**Training Programs:** Number of training programs conducted Number of participants in training programs Participants' knowledge and skills development after the training.
	Mentorship and Coaching: Mentorship programs implemented in a year Mentors and mentees participating in the program for a year Mentees' performance increment in a year Collaborations or projects initiated by mentees in a year
	Skill development: Researchers or innovators who have developed new skills or competencies in a year Increment of quality of research outputs in a year Innovations or inventions in a year resulting from capacity-building efforts

	Professional Development Opportunities: Researchers who attended conferences, workshops or seminars in a year Publications in peer-reviewed journals in a year Patents or intellectual property rights filed in a year
	Job Satisfaction and Retention: Overall job satisfaction, career development opportunities, and work-life balance in a year Number of employees leave the organization in a year
Stakeholder Mapping and Analysis	**Stakeholder Mapping:** Identified and categorized stakeholders Accuracy of stakeholder categorization (e.g., primary, secondary, key) Completeness of stakeholder profiles (e.g., interests, influence, potential impact) Strength of relationships with key stakeholders
	Stakeholder Engagement: Stakeholders engagement activities conducted (e.g., meetings, workshops, surveys) Stakeholders who participated in engagement activities stakeholder satisfaction with engagement activities Collaborative partnerships formed as a result of stakeholder engagement in a year Strength of relationships with key stakeholders Collaborative projects or initiatives undertaken with key stakeholders in a year Level of trust and cooperation among stakeholders
	Stakeholder Influence: Ability to influence key decision-makers and opinion leaders Success in mobilizing support for innovation initiatives Effectiveness in addressing stakeholder concerns and objections
	Knowledge Sharing and Collaboration: Knowledge-sharing platforms or forums established in a year Level of participation in knowledge-sharing activities Collaborative projects or initiatives in a year resulting from knowledge-sharing
	Impact Assessment: Positive impact of stakeholder engagement on innovation outcomes Increased awareness of innovation initiatives among stakeholders Improved collaboration and cooperation among stakeholders Enhanced capacity of stakeholders to contribute to innovation efforts
Innovation Communication Strategy	**Multi-channel Communication Using Digital Platforms:** Programs aired on each radio and TV station in a year Broadcast time across all programs in a year Average listenership or viewership ratings for programs featuring the campaign in a year Podcast episodes released in a year Press statements issued in a year Newsletters and reports in year Webinars and workshops in year Downloads or streams for podcasts in a year
	Social Media Metrics: Followers on relevant platforms in a year

	Engagement rate (likes, shares, comments) on social media posts related to the campaign in a year Website traffic to campaign-related pages in a year
	Campaign Effectiveness: Cost per thousand impressions (CPM)
	Knowledge Sharing and Practices Disseminations: Case studies and success stories Research and data sharing
	Tailored Stakeholder Engagement: Provide concise policy briefs, data insights, and evidence-based recommendations for Policymakers Create collaboration platforms such as research forums, innovation workshops, and digital knowledge repositories for researchers and innovators Use community-based media and grassroots organizations to educate the public about innovation initiatives for local communities Public Engagement and Awareness Initiatives
Monitoring and Evaluation (M&E)	**Performance Metrics and Regular Reporting:** Training participants, new innovations commercialized, stakeholder engagement levels, and the success rate of funded projects Quarterly or annual reports to ZIA's leadership and stakeholders on the outcomes of innovation initiatives
	M&E of Integrated Online Information System: Data entries in a year that are correct and free from errors Data entries that are recorded in a year Individuals who have logged into the system in a year The frequency with which users access the system in a year Feedback from users regarding the system's usability, functionality, and ease of use in a year Computational resources required to run the system Total amount of time during which the system is unavailable due to technical issues or maintenance Data security incidents reported in a year System vulnerabilities identified and addressed in a year
Stakeholder Collaboration and Public Engagement	**Public Campaigns:** National campaigns with stakeholder engagement that promote the value of science, technology, and innovation Engagement of the public in innovation through citizen science projects

By adopting the strategic elements outlined in this chapter, ZIA can effectively develop and implement a robust innovation communication and capacity-building strategy that leverages international best practices. With clear objectives, strong stakeholder engagement, targeted training programs, and a focus on public involvement, Zambia can build an innovation ecosystem that supports its goals for sustainable development and climate resilience. ZIA's strategy will drive technological progress and ensure that Zambia's human resources are well-equipped to lead the nation into a new era of innovation and economic transformation.

Chapter 4. Case Studies on the Development of a Web-Based Platform

1. Outline

The web-based platform plays a transformative role in advancing innovation communication and capacity building. It can centralize access to critical resources, facilitate real-time information sharing, enable stakeholder collaboration, and provide training and capacity development tools. For the Zambia Innovation Agency (ZIA), developing a platform tailored to local needs while leveraging insights from successful platforms in other countries will be critical to driving sustainable development and fostering a resilient and low-carbon economy. This chapter explores detailed case studies from Korea, Japan, the United Kingdom, the European Union and other African countries, illustrating how these platforms function and offering actionable insights that ZIA can adapt to the Zambian context. The goal is to outline an implementable concept for an online platform to support innovation communication, capacity building, and collaboration in Zambia.

2. Climate Technology Information System (CTis)

The CTis platform, established by the Korean government in 2017, is a digital portal dedicated to global climate technology cooperation. It provides comprehensive insights into available climate technologies, policy updates, project data, and visual tools for data analysis.

[Figure 4-1] CTis: Main Interface and Key Functions

Source: https://ctis.re.kr/ko/index.do (*Accessed on May 15, 2024*)

The main functions of the system CTis are:

- **Trends**: The system enables users to track major domestic and international organizations, as well as access to relevant research data and publications.
- **Climate Technology**: CTis offers insights into emerging climate change response technologies at both national and global levels. It provides information on technology demands from developing countries, domestic climate technology advancements, and the investment landscape within the national R&D sector.
- **Climate Projects**: Users can explore detailed information about domestic and international business initiatives ad project cases related to climate technology cooperation. This function highlights best practices and successful collaborations in the field.
- **Statistics/Analysis**: The platform delivers comprehensive visualization tools and customized analysis capabilities, leveraging statistical data on climate change and technology cooperation. This feature enables stakeholders to gain data-driven insights and make informed decisions.

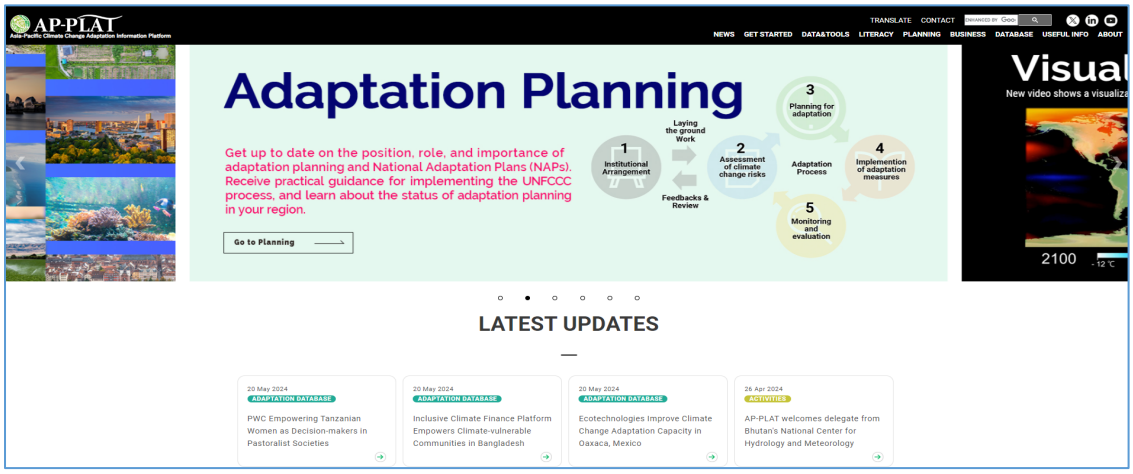
Generally, CTis serves as a vital resource for promoting climate technologies and fostering innovation. By providing comprehensive information, facilitating collaboration, and engaging the public, CTis is contributing significantly to Korea's efforts in addressing climate change and promoting sustainable development.

3. Asia-Pacific Climate Change Adaptation Information Platform (AP-PlAT)

The AP-PLAT platform, launched by the Japanese government in 2019, is designed to support evidence-based decision-making for climate change adaptation in the Asia-Pacific region. Its primary objective is to enhance international cooperation and capacity-building efforts, focusing on integrating cutting-edge scientific knowledge into actionable policy and practice. By providing access to climate data, risk assessment tools, and best practices in climate adaptation, AP-PLAT aims to strengthen regional resilience and support the strategic alignment of climate adaptation initiatives. The main functions of the system are:

- **Scientific Knowledge Creation**: gathers and integrates climate risk data from scientific studies, offering in-depth information about climate vulnerabilities in specific regions, which is essential for forming policies that are both reactive and proactive in dealing with climate impacts.
- **User-Friendly Tools**: develops easy-to-use tools to simplify the translation of scientific data into actionable policies. For example, users can access hazard maps and climate impact assessment tools that provide a detailed overview of climate risks.
- **Capacity Building and Training**: features extensive capacity-building resources, including online training programs and webinars on climate adaptation techniques and policy formulation.

[Figure 4-2] AP-PLAT: Core Functions and Features



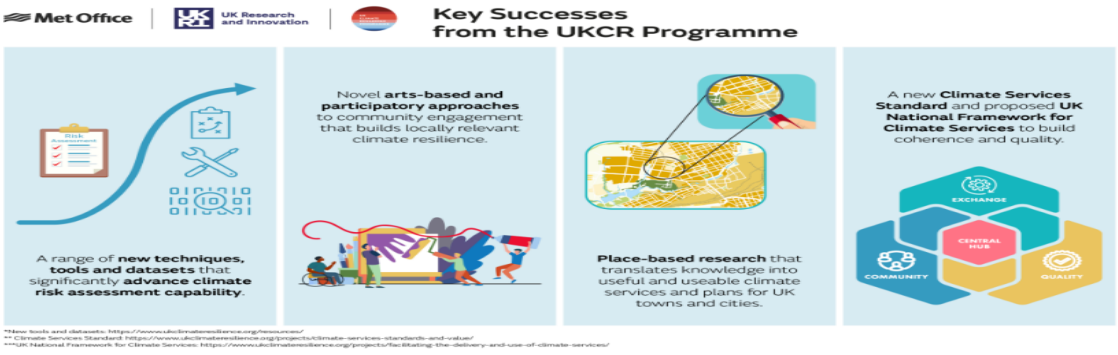
Source: https://ap-plat.nies.go.jp/ ((*Accessed on May 20, 2024*))

4. The UK Climate Resilience Program

Launched in 2018, the UK Climate Resilience Program is a multi-disciplinary initiative aimed at addressing climate risks in the UK, which integrates research, data collection, and policy support tools to help the country mitigate climate risks and enhance adaptation strategies. It is a model of integrating climate science into actionable policies that benefit communities, industries, and governments. The main functions of the system are:

- **Improving Climate Science**: provides access to cutting-edge research on climate change, focusing on understanding the effects of climate variability and preparing for future scenarios.
- **Enhancing Adaptation Strategies**: These help users create and refine adaptation strategies.
- Capacity Building and Public Engagement: build awareness among communities, encouraging grassroots participation in climate resilience projects. It also offers a range of resources to empower policymakers and the general public on climate impacts.

[Figure 4-3] Key Successes of the UK Climate Resilience Program



Source: https://www.ukclimateresilience.org/ (*Accessed on June 1, 2024*)

5. Climate-ADAPT

Launched in 2012, Climate-ADAPT is a platform developed by the European Commission in partnership with the European Environment Agency (EEA) to support EU member states in developing and implementing climate-resilient policies. This platform offers a comprehensive

array of data, decision-support tools, and adaptation strategies widely used across EU member states to develop climate-resilient policies. The system facilitates informed decision-making and promotes sustainable resilience across the European Union by providing sector-specific insights. The main functions of the system are:

- **Data and Information Sharing**: integrates climate projections, vulnerability assessments, and sector-specific climate impacts into an easy-to-navigate portal.
- **Adaptation Planning Tools**: enable users to develop comprehensive adaptation plans that consider local climate projections and vulnerability data, and help users to access international funding and grants for adaptation projects.
- **Policy Integration**: focuses on aligning adaptation strategies with broader EU policies. It also enables member states to harmonize climate resilience efforts with overarching regulatory and policy objectives, fostering coherence across sectors and enhancing the effectiveness of climate adaptation measures within the EU's policy landscape.

6. The South African Innovation Hub

The Innovation Hub, the innovation agency of the Gauteng Province, is a wholly owned subsidiary of the Gauteng Growth and Development Agency. It was established by the Gauteng Provincial Government through its Department of Economic Development to promote the province's economic development and competitiveness by fostering innovation and entrepreneurship.

The Innovation Hub offers several incubation programs in the Bioeconomy (agro-processing and pharmaceutical), Smart Industries (ICT and advanced manufacturing), and Green Economy (Water purification, waste management, and renewable energy). In addition, the Innovation Hub operates a range of enterprise development, skills development, and innovation-enabling programs in the science park and throughout the Gauteng region.

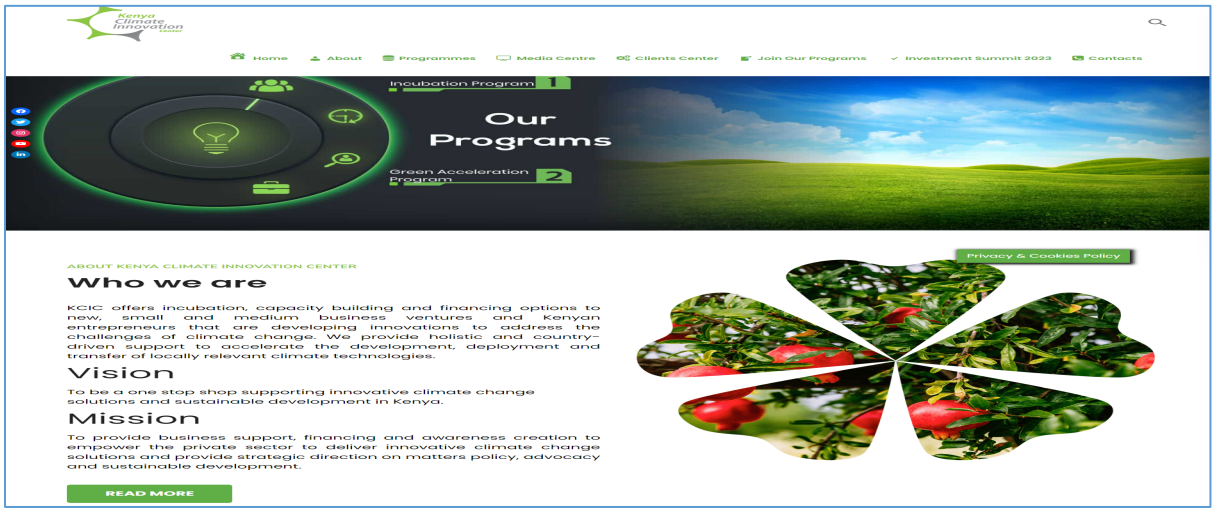
[Figure 4-4] Interface of the South African Innovation Hub

Source: https://www.theinnovationhub.com/ (*Accessed on November 1, 2024*)

7. Kenya Climate Innovation Center (KCIC)

Launched in Nairobi in September 2012 by the World Bank Group's Climate Technology Program, the Kenya Climate Innovation Center (KCIC) is a pioneering model designed to drive climate innovation and foster sustainable enterprise growth in emerging markets. KCIC has positioned itself as a central hub for advancing green growth in Kenya, providing comprehensive support to over 130 startups and early-stage enterprises focused on innovative solutions in critical climate-related sectors, such as renewable energy, bioenergy, climate-smart agriculture, water resource management, and low carbon services. KCIC provides a range of support to entrepreneurs, including incubation, capacity-building, and financing options to foster small and medium-sized enterprises addressing climate change challenges. KCIC's unique value lies in its holistic, country-driven approach to developing, deploying, and localizing climate technologies. Focusing on the entire innovation lifecycle- from ideation and prototyping to market adoption- effectively accelerates the delivery of solutions that are contextually relevant and impactful for local communities. The mission of KCIC is to empower the private sector with business support, financing, and awareness creation for innovative climate change solutions. It aims to provide strategic direction in policy advocacy and promote sustainable development, positioning itself as a crucial intermediary between technology developers, entrepreneurs, and policymakers.

[Figure 4-5] Interface of the Kenya Climate Innovation Center (KCIS)



Source: https://www.kenyacic.org/about-us/ (*Accessed on November 1, 2024*)

Chapter 5. Concept Development of a Web-Based Platform on Innovation

1. Outline

The ZIA online platform is designed to centralize and enhance innovation communication, capacity building, and collaboration across Zambia's science, technology, and innovation ecosystem. By drawing on successful models from different countries, the platform will provide a comprehensive digital hub that addresses Zambia's specific needs, particularly in fostering low-carbon and climate-resilient economic development.

The platform will function as a central repository of information, tools, and services to accelerate innovation, facilitate stakeholder engagement, and support decision-making processes for policymakers, industries, researchers, and local communities. Below is a detailed concept of the platform's structure and function to achieve these goals. The objectives of the platform are:

- **Centralized Access to Innovation and Climate Data**: provide real-time access to the latest developments in climate-resilient technologies, innovation trends, and policy updates.
- **Collaboration and Networking**: foster a collaborative ecosystem where stakeholders (government, academia, private sector, NGOs, and international partners) can collaborate on projects that address Zambia's most pressing sustainability challenges.
- **Capacity Building**: equip local industries, startups, researchers, and policymakers with the skills, tools, and knowledge needed to innovate and implement climate-resilient strategies through online trainings.
- **Policy and Decision Support**: offer tools and resources to assist decision-makers in crafting effective, evidence-based policies aligned with global best practices for climate adaptation and low-carbon development.

Target Users of the Platform

ZIA's platform should be designed to serve multiple stakeholders including:

- **Policymakers** who require real-time data to develop climate-resilient innovation strategies
- **Researchers** who need access to sector-specific climate data for academic and applied research
- **Private sector entities** looking for innovation and technology solutions to increase competitiveness and sustainability
- **Communities and NGOs** working on grassroots-level climate adaptation and capacity-building projects
- **Young individuals**, particularly students and early-career professionals, who are interested in learning about climate innovation, acquiring relevant skills, and participating in sustainability projects
- **Women** in various sectors, including those impacted by climate change and those leading solutions
- **Individuals, startups, and organizations** developing new technologies or solutions for climate resilience and sustainability

2. Key Components and Features of the Platform

2.1. Innovation and Climate Technology Database

The purpose of the platform is to establish a comprehensive and searchable repository of climate and innovation technologies that align with Zambia's specific needs. This includes technologies in key sectors such as renewable energy, sustainable agriculture, water management, and mining.

One of the core features of the platform is a technology directory, which serves as a catalogue of available green technologies, organized by industry or application. This allows users to easily identify and access relevant solutions tailored to their sector.

The platform also integrates local needs by highlighting technologies that are in high demand across Zambia, with a particular focus on critical areas such as agriculture, water, energy, and mining. This ensures that the platform remains relevant and responsive to the country's pressing challenges.

Additionally, the platform showcases case studies and success stories that illustrate the successful implementation of climate-resilient technologies in Zambia and similar

environments. These examples provide users with practical insights into how these technologies can be applied effectively, fostering greater adoption and innovation.

2.2. Policy Trends and Regulation Hub

The platform is designed to keep stakeholders informed about domestic and international policy developments related to climate resilience, innovation, and sustainable development. Its goal is to ensure that decision-makers, businesses, and communities stay updated on relevant regulations and opportunities that can drive Zambia's sustainable growth.

A key feature of the platform is the **Policy Updates** section, which provides regularly updated information on Zambia's regulatory landscape. This includes details on climate-related regulations, innovation funding opportunities, and evolving environmental standards. By offering timely updates, the platform helps stakeholders navigate policy changes and take advantage of new initiatives.

The platform also offers Global Policy Insights, highlighting international policies and frameworks that Zambia can align with to unlock funding and foster partnerships. This section draws inspiration from platforms like the EU's Climate ADAPT, providing valuable references for aligning Zambia's policies with global climate goals.

To further support national development, the platform integrates tools that help policymakers assess how their projects align with Zambia's Vision 2030, national climate strategies, and global agreements such as Paris Agreement. This ensures that policies and projects contribute to Zambia's long-term development goals while remaining aligned with global frameworks.

2.3. Project Management and Monitoring Tools

The platform is designed to track and manage innovation projects, ensuring transparency, accountability, and alignment with Zambia's national climate and innovation goals. By providing structured tools and resources, it supports project development and enhances oversight throughout the project lifecycle.

Key component is the Project Dashboard, which allows both public and private users to submit, track, and report on projects focused on climate innovation, low-carbon technologies, and capacity-building initiatives. This dynamic feature ensures that all project data is easily accessible and organized, fostering collaboration and streamlined management.

The platform also includes a Funding Tracker, which connects projects with national and

international funding opportunities. It allows users to monitor grant applications and track disbursement of funds, ensuring that financial resources are allocated effectively and transparently.

To assess project outcomes, the platform offers **Impact Monitoring** tools that measure the social, economic, and environmental impact of ongoing initiatives. Results are presented through intuitive charts and graphs, drawing from best practices seen in Korea's CTiS and the UK's Climate Resilience Program. This feature provides stakeholders with clear insights into project performance and long-term benefits.

2.4. Sector-Specific Climate Adaptation Tools

The platform is designed to provide tailored tools that support industries and local governments in developing and implementing effectively climate adaptation strategies. By offering practical resources, it helps stakeholders proactively address climate risks and enhance resilience across key sectors.

One of the core features is the **Risk Assessment Tool**, modeled after AP-PLAT, which enables users to input local data such as geographic or industry- specific information to evaluate climate risks and vulnerabilities. This tool helps identify areas most at risk and guides targeted interventions.

The platform also offers **Adaptation Planning** resources, including sector-specific tools for industries like agriculture, mining, and energy. These tools provide strategies and technologies to strengthen resilience, such as drought-resistant crops for agriculture and renewable energy systems for mining operations. By addressing the unique needs of each sector, the platform ensures practical and actionable solutions.

Scenario Analysis Tools allows users to simulate different climate futures and evaluate the effectiveness of various adaptation strategies. This feature supports long-term planning by helping industries and local governments visualize potential outcomes and refine their approaches based on projected climate conditions.

2.5. Capacity Building and Training Modules

The platform aims to enhance the skills of policymakers, industry leaders, researchers, and community organizers through structured training programs that promote climate resilience, innovation, and sustainable development.

A key feature is the **Online Learning Portal**, which provides a comprehensive learning environment with courses, certifications, and webinars. Topics covered include climate resilience, innovation management, and low carbon technology implementation, drawing inspiration from Japan's AP-PLAT and Korea's KIRD models. This portal allows users to upskill at their own pace, making advanced knowledge more accessible.

The platform also hosts **Local and International Expert-Led Webinars** on a monthly basis. These sessions are conducted by Zambian experts and international partners, offering insights into the latest climate technologies, innovation strategies, and sustainability practices. This regular engagement ensures that stakeholders remain informed about cutting-edge developments.

Additionally, **Certification Programs** are available through partnerships with local and international academic institutions. These programs provide formal training in areas such as sustainable development, entrepreneurship, and climate-smart agriculture. By offering recognized certifications, the platform helps participants build credentials that can drive career advancement and foster leadership in climate action.

2.6. Collaboration and Networking Hub

The platform is designed to foster partnerships, collaboration, and knowledge exchange between Zambian and international stakeholders, driving innovation and sustainable development.

A core feature is the Industry and Research Collaboration Platform, which serves as a networking hub connecting local industries, startups, universities, and international partners. This platform facilitate joint projects, technology transfer, and research collaborations, promoting cross-sector innovation and capacity building.

The platform also hosts Innovation Challenges and Hackathons, providing opportunities for local innovators to tackle pressing national issues. Inspired by Korea's KOFAC model, these competitions offer funding, incubation, and mentorship as rewards, encouraging creative solutions and entrepreneurship.

To strengthen cooperation between sectors, the platform includes a Public-Private Partnership (PPP) Matchmaking Tool. This feature helps public entities and private enterprises discover potential partners for innovation projects, with a focus on areas such as infrastructure development and renewable energy. By connecting key players, the platform accelerates

project implementation and scales impactful initiatives across the country.

2.7. Innovation Funding Hub

The platform is designed to connect innovators, businesses, and researchers with funding opportunities from both local and international sources, supporting the growth of Zambia's green technology and innovation sectors.

A key component is the **Funding Database**, which provides an integrated directory of available grants, loans, investment capital, and international climate funds. Users can filter opportunities by project type, sector, or region, making it easier to identify relevant funding sources that align with their initiatives.

The platform also features a **Funding Application Portal** with a user-friendly interface that allows innovators to apply directly for grants and funding from the Zambian government or international climate programs. This streamlines the application process and increases accessibility to financial resources.

Additionally, the **Investor Matchmaking** tool connects local innovators and startups with domestic and international investors. By fostering these connections, the platform helps drive investment into Zambia's green technology sector, encouraging innovation and accelerating sustainable development.

3. Web-Platform Architectural Framework

The conceptual framework shown in Figure 5.1 represents a climate-resilient innovation platform tailored to Zambia's mission of advancing sustainable development through data-driven and AI-enhanced decision-making. The platform is structured in three layers-Presentation Layer, Application Layer, and Data Layer-to empower stakeholders across government, research, and local communities in addressing climate challenges collaboratively.

The Presentation Layer provides an intuitive user interface, enabling diverse interactions for various stakeholders, which includes a Community Portal for public engagement and collaboration; a Resource Library for sharing climate-resilient resources; and a Capacity Building and Training module with AI-driven personalized learning recommendations. The platform can provide targeted resources that enhance climate resilience awareness and skills.

The Training Portal incorporates adaptive learning algorithms to deliver customized training experiences based on individual needs, while an AI-powered Alerts System prioritizes and

disseminates critical climate-related updates derived from real-time data analytics. Additionally, a Public Dashboard provides dynamic insights into climate resilience indicators, and an interactive Map allows users to visualize climate impact areas, track ongoing projects, and assess regional vulnerabilities. API integration within this layer facilitates seamless data exchange with external systems.

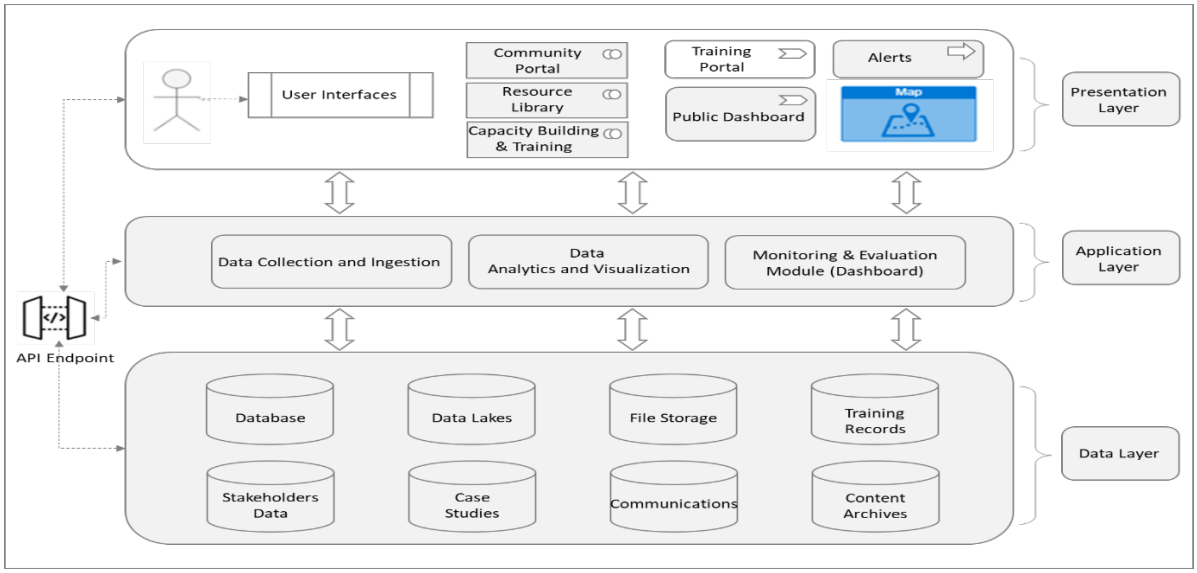
The Application Layer serves as the framework's core processing engine, transforming large datasets into actionable insights. The Data Collection and Ingestion module integrates various APIs to pull data from sources like environmental sensors, remote monitoring systems, and public databases. Data Analytics and Visualization are AI-enhanced, utilizing machine learning algorithms to detect patterns, predict potential climate events, and provide stakeholders with forecast models. This module enables stakeholders to make informed decisions by visualizing these insights in the Presentation Layer.

The Monitoring & Evaluation (M&E) Module tracks the effectiveness of climate-resilience initiatives and leverages AI to assess project success, suggesting improvements as needed. Additionally, a Stakeholder Analysis Module utilizes natural language processing (NLP) to evaluate communication patterns, engagement levels, and sentiment, providing a comprehensive overview of stakeholder roles, interests, and influence.

The Data Layer forms the foundational backbone of the framework, hosting a variety of critical data resources, which includes Databases for structured data; Data Lakes for extensive collections of raw sensor and monitoring data; and File Storage for multimedia content. Specialized AI models categorize, process, and tag data, making it easily accessible for analysis. Training Records track capacity-building progress, while Stakeholder Data offers detailed insights into partnerships and collaboration metrics, enhanced through automated relationship mapping. Communications Archives employ AI-based summarization tools to capture essential interactions and feedback from stakeholders, aiding in review of past decisions and guiding future actions.

This AI-enhanced, API-integrated framework supports real-time data flow, predictive insights, and customized recommendations, fostering collaborative climate-resilient innovation across Zambia. The design promotes data-driven decision-making, streamlines stakeholder engagement, and enables seamless integration with external systems.

[Figure 5-1] Web-Platform Architectural Framework



5.4 Web-Platform Development Phase

ZIA's web-platform development will be divided into phases, which include planning and requirement gathering, design and prototyping, development, testing and quality assurance, launch, testing and capacity, and continuous support. Table 5-1 shows ZIA's web platform development phases.

[Table 5-1] Platform Development Phases: Key Activities, Deliverables and Timeline

Phase	Key Activities	Deliverables	Timeline
I. Research and Planning & Requirements Gathering	• Define platform goals, features, and scope in alignment with stakeholder needs • Conduct stakeholder meetings and surveys to gather detailed requirements • Prepare a detailed project plan, including timelines, budget, and resource allocation • Identify the technology stack (e.g., HTML, CSS, JavaScript for the front end; Node.js, Python for the back end)	• Project scope document • Finalized feature list • Technology stack selection • Initial wireframes and user flow diagrams	Month 1 - Month 2
II. Design and Prototyping	• Develop platform design, including user interface (UI) and user experience (UX) design for both desktop and mobile versions • Create wireframes and mockups for key sections (e.g., home page, data visualization, education resources) • Review designs with stakeholders for feedback and revisions	• High-fidelity wireframes and mockups • Design approval from stakeholders • Interactive prototype (optional)	Month 3 - Month 4
III.	• Front-End Development • Back-End Development • Database Integration • Data Visualization Tools	• Fully developed front-end and back-end features • Database integration	Month 5 - Month 8

Development	• Content Management System (CMS)	and API connections • CMS for content management • Initial deployment of the platform on a staging server for testing	
IV. Testing and Quality Assurance	• Conduct usability testing with a focus group to ensure the platform is user-friendly and meets stakeholder expectations • Perform functional testing to check all features, including data visualization, educational content access, and user interactions • Security testing to ensure platform data integrity and user privacy • Fix bugs and optimize performance based on feedback from testing	• Usability and functional testing reports • Bug fixes and performance enhancements • Finalized version ready for launch	Month 9
V. Launch	• Deploy the platform to a live production server • Ensure that all content (educational resources, reports, data visualization) is uploaded and properly organized • Conduct a soft launch with a limited group of users for feedback • Implement a feedback mechanism on the platform to collect ongoing user suggestions	• Platform lives for public access • Content fully populated • User feedback system active	Month 10
VI. Training and Capacity Building	• Provide training sessions (both in-person and online) for stakeholders, platform administrators, and community users on how to use the platform • Develop training materials such as user guides, video tutorials, and FAQs • Encourage early adopters to engage with the platform and provide feedback actively	• Completed user training sessions • Training materials available on the platform • Feedback and usage analytics from initial users	Month 11
VII. Ongoing Support and Maintenance	• Set up a technical support team for ongoing maintenance and issue resolution • Monitor platform performance, including uptime, speed, and user engagement • Implement periodic updates to improve features based on user feedback and new climate data integration	• Fully operational support system • Ongoing performance monitoring reports • Updates and upgrades as needed	Month 12 & beyond

The ZIA online platform will drive Zambia's innovation ecosystem toward climate-resilient and low-carbon development strategies. By centralizing resources, facilitating collaboration, and providing tools for policy and decision-making, ZIA's platform will empower local stakeholders and ensure Zambia's preparedness to meet its sustainable development goals.

Chapter 6. Conclusion

Zambia's national development aspirations, as outlined in its Vision 2030 and commitment to sustainable, low-carbon emission growth, demand a robust innovation ecosystem capable of addressing global challenges such as climate change while fostering economic resilience. This report has examined strategic approaches to enhance Zambia's innovation communication and capacity-building initiatives. Drawing on international best practices from countries such as Korea, Japan, the UK, the European Union, South Africa, Kenya and Ghana, the report provides a comprehensive strategic framework for strengthening the innovation communication and capacity-building efforts of the Zambia Innovation Agency (ZIA).

Climate resilient innovation, technology and capacity building solutions are pivotal in driving economic development in Zambia. Supporting sustainable development while tackling climate change and striking a balance between economic growth and environmental sustainability would be the main objectives of Zambia's low carbon emission and climate-resilient economic development plan. The plan shall be prioritized pillars of the proposed national innovation communication and capacity building as well as an online platform. This includes taking community involvement, sustainable agriculture practices, renewable energy utilization and forest protection into account.

By supporting green startups, fostering collaborative efforts, and creating an enabling innovation environment through policies and financing, communities can enhance their resilience to climate change while promoting sustainable economic green growth. Additionally, this innovation communication and capacity building outlined web-based portals for the national framework for climate services in Zambia to help society better manage the opportunities and risks brought about by climate change and variability, particularly for those most at risk from climate-related hazards.

Drawing upon global best practices, including key examples from international cases, this report provides a comprehensive framework for the Zambia innovation communication and

capacity development system strategies to drive climate-resilient economic growth through innovation and offers strategic recommendations in capacity building, communication and web-based platform development. The proposed strategy consists of six pillars of frameworks including goal setting, stakeholder mapping, innovation communication approach, capacity-building, monitoring and evaluation and stakeholder collaboration and public engagement. We also identified key performance indicators (KPIs) for implementing the strategy.

Consequently, by drawing on successful models from different countries, we designed the ZIA's innovation communication and capacity building online platform to centralize and enhance innovation communication, capacity building and collaboration across Zambia's science, technology and innovation ecosystems. The platform will provide a comprehensive digital hub that addresses Zambia's specific needs, particularly in fostering low-carbon emission and climate-resilient economic development. The major key features of the platform are climate innovation database, policy trends and regulation hub, project management and monitoring tools, sector-specific climate adaptation tools, capacity building and training modules, collaboration hub and innovation funding hub. Besides, we developed architectural framework, architectural design and development phases of the web platform, which will be implemented by ZIA.

ZIA's innovation and capacity building platform is designed to serve multiple stakeholders including policymakers, researchers, private sector entities, communities and NGOs, youths, women, and innovators. Accordingly, Zambia could draw valuable lessons from successful experiences from different countries for implementing the developed strategy and platform. By understanding these experiences, the ZIA could can adopt similar approaches to implement the innovation and capacity building program to support climate resilience and sustainable economic growth of the country.

To operationalize the strategy and translate it into measurable outcomes, Zambia's government should undertake a series of targeted interventions. These will ensure effective implementation of the innovation communication and capacity-building strategy, as well as the development and deployment of the ZIA online platform.

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

Affiliation	Position	Name
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. IC (Innovation Communication) and CB (Capacity-Building) Strategy and Concept of a Web-based Platform by Local Teams

<Team 1: IC and CB Strategy >

Objective Setting	• To promote technology and science as an instrument for fostering low carbon and climate resilient economic development in Zambia
Stakeholder Analysis	• Ministry of Technology and Science - to coordinate the plan. • Line ministries • Research Institutions • Academia • Students • Civil Society Organisations • Private Sector • Developmental partners
Communication Strategy	Overarching strategy to customise material for various target groups • Awareness Materials • Frequent radio and TV programmes • Scientific and technical symposiums and expo • Online media platform (Podcasts, press statements etc)
Capacity-building Initiatives	• Strengthen inhouse capacity for researchers • strengthening national capacities for researchers to promote R & D to foster low carbon and climate resilient economic development in Zambia • Share opportunities to professionals outside ZIA for continuous professional development to promote R&D • Recognitions and awards for outstanding researchers and innovators
Resource Allocation	• Government Grants • Bilateral and Multilateral partner funding • Joint and counterpart funds • Human resource
Monitoring and Evaluation	• Integrated online information system for M&E • Robust M&E frameworks that are periodically updated to suit the changing need.
Public Engagement and Awareness	Robust information, Communication and Education programs • Social media platforms • Booklets, flyers, pamphlets etc

<Team 2: IC and CB Strategy>

Objective Setting	• **To increase awareness, foster collaboration, and capacity building of innovation among stakeholders and the general public**
Stakeholder Analysis	• **Government line ministries** • **Statutory bodies/Regulatory Agencies** • **Private/Industry sector** • **Academia/Research institutions**
Communication Strategy	• **Multi-Channel Approach: Utilize various communication channels including social media, newsletters, webinars, workshops, etc.** • **Engagement platforms e.g. Conferences/international & regional symposium for dialogue among stakeholders, USSD, etc.** • **Feedback Mechanisms: Establish mechanisms for stakeholders to provide feedback and contribute to the innovation agenda**
Capacity-building Initiatives	• **Training programs e.g. workshops, seminars on innovation management, entrepreneurship, and technology transfer** • **Mentorship and Coaching: Develop mentorship and coaching programs connecting experienced professionals with emerging innovators** • **Innovation Hubs and Incubators: To provide resources, support, and networking opportunities** • **Research and Development: Promote R&D through grants, scholarships, and collaborative projects between academia and industry.**
Resource Allocation	• **Direct financial support through government treasury.** • **Partnerships: Leverage partnerships with international organizations, private sector, and academia to pool resources and expertise**
Monitoring and Evaluation	• **Performance Indicators: Develop key performance indicators (KPIs) to measure the success of communication and capacity-building efforts.** • **Regular Reporting: Implement a reporting system to regularly assess progress and make data-driven decisions.** • **Feedback Loops: Create mechanisms for continuous feedback from stakeholders to refine strategies and initiatives.** • **Impact Assessment: Conduct periodic impact assessments to evaluate the long-term effects of innovation initiatives on the economy and society**
Public Engagement and Awareness	• **Multi-channel communication: social media, newsletters, USSD, etc.**

<Team 1: Concept of a Web-based Platform >

Headline	About Us	Publications	Media and News Centre	National Information System	Related Links
Climate Resilience	• Back ground • Mission statement • Vision • Services offered • Contact details	• Reports • Statistics • Policy • Related legislation	• Media • News centre • Promotional video clips • User manual • Educational materials	• Users will have access to national STI database	• Cooperating partners • Line Ministries • Other STI intitutions

<Team 2: Concept of a Web-based Platform >

Home	About Us	How To	Publications	News and Event	Useful Links
• Latest Updates • Notices • Social Media links • Contact Us	• Background • Mission • Vision • Objectives • Operational Structure	• Apply for Support • FAQs • Sign Up/In	• Success Stories • Statistics • Reports • Circulars	• Call for Proposals • Newsletters • Ongoing Projects • Useful Downloads	• MoTS • Line ministries • Our Partners