CONCEPT NOTE FOR BILATERAL RESEARCH COOPERATION BETWEEN SWEDEN AND ZAMBIA 2026-2028

SUBMITTED BY THE UNIVERSITY OF ZAMBIA

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1.0 BACKGROUND

1.1 History of the University of Zambia

The University of Zambia (UNZA) was established as the country's first public university, after independence through the *University of Zambia Act Number* 66 *of* 1965. At the commencement of operations in 1966, the University had three Schools, namely the School of Education, the School of Humanities and Social Sciences, and the School of Natural Sciences. As the national need for training more human capital was recognised, new school infrastructure and facilities were introduced such as the Schools of Law (1967), Engineering (1969), Medicine (1970), Agricultural Sciences (1971), Mines (1973), Business and Industrial Studies, and Environmental Studies at Ndola Campus in 1978 and 1981 respectively ,and Veterinary Medicine (1983). By *Act of Parliament No.* 19 *of* 1987, Ndola Campus separated from UNZA and became Copperbelt University based on the Copperbelt Province [1].

For several years, the University maintained the status quo until 2015 when a new School, the Graduate School of Business, at the Great East Road Campus, was added to the existing nine schools. In 2016, the School of Medicine was split into four Schools namely; the School of Nursing Sciences, the School of Public Health, the School of Health Sciences, and the School of Medicine, bringing the total number of Schools in the University to thirteen. There were two Directorates; the Directorate of Quality Assurance and the Directorate of Research, Innovation and Development (DRID) until 2024 when DRID was separated into 3 directorates namely; Directorate of Research and Development (DRD), Directorate of Collaborative Research Hub for Multidisciplinary Advancement (CHRMA) and Directorate of Innovation, Technology Transfer and Commercialisation (DITTC). In addition, there are two institutes: the Institute of Distance Education (IDE) and the Institute of Economic and Social Research (INESOR). These are supported by the Centre for Information and Communication Technology (CICT) and the University of Zambia Library System.

UNZA's governance framework and operations has undergone several transformations. Initially, the *University of Zambia Act* No. 66 of 1965 provided for the Republican President as the Chancellor, with the authority to appoint the Vice-Chancellor (VC) and the Deputy Vice-Chancellor (DVC). However, this has since changed with the Head of State no longer being the Chancellor and appointing authority of the institution's heads (VC and DVC). After the 1991 transition to the multi-party-political system, the *University Acts* (19 and 20) *of* 1987 were repealed and replaced by the *University Act of* 1992. For the first time, the Chancellorship of public universities changed from the Head of State to eminent Zambian citizens with distinguished professional careers and contribution to national development. The *University Act of* 1992 reduced the powers of the Minister of Education over the governance of public universities to matters of general policy on higher education. This reasserted the autonomy of public universities.

The *University Act of* 1992 was repealed and replaced by the *University Act No.* 11 *of* 1999, under which the Minister of Education regained considerable powers over the operations of both public and private universities. In 2013 the *University Act* No. 11 *of* 1999 was repealed and replaced by the *Higher Education Act* No. 4 *of* 2013 which provided for the establishment, governance and regulation of public and private higher education institutions.

In May 2021, the *Higher Education (Amendment) Act* No. 23 *of* 2021 was promulgated by Parliament [1]. Among other changes included the Act's regulation of public and private higher education institutions. The Act also reasserted the powers of the Minister for Higher Education; with emphasis on creating and delivering quality higher education underpinning Zambia's development agenda.

1.2 Previous and current context for research funding in Zambia and the University of Zambia

Since inception UNZA has received funding from different cooperating partners such as Swedish International Development Agency (Sida), the World Bank, Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED), and the Japanese International Cooperation Agency (JICA) among others. However, this support started to decline around the 1990s leading to a decline in the number of Research and Development (R&D) outputs.

In Zambia, research is funded either by government appropriation to the Public Research Institutions through their respective Government Ministries, or grants through funding agencies either locally, regionally or internationally. Zambia's R&D expenditure is quite low compared to other countries globally. In 2022, Zambia's gross domestic expenditure on research and development (GERD) as a share of GDP was 0.28 percent [2]. Generally, research and development activities in Zambia are currently underfunded. Some of the other challenges surrounding research include lack of adequately trained personnel, appropriate infrastructure and requisite equipment. Research and development personnel are a key resource. It is recommended that for any country aspiring to attain middle-income status and for research to effectively contribute to national development, it should have adequate and well-trained human resources; a minimum of at least 1,000 researchers in R&D per million inhabitants as stipulated by the AU NEPAD Africa Outlook Report [3]. For Zambia however, the report indicates that there were only 50 researchers per million inhabitants in 2010. This number is too low, and it has not significantly changed. [4]. Furthermore, research infrastructure and equipment play a critical role in the advancement of research in any nation. However, most existing research facilities in Zambia, specifically at UNZA are dilapidated, no longer fit for purpose and inadequate for appropriate research activities. In addition, the equipment is outdated and obsolete. In general, the research infrastructure is not adequately supported. This has resulted in low or poor R&D outputs in universities and R&D institutions.

The research landscape at UNZA has significantly changed in the past 5 years as new policies have been developed to govern research in the country and institutions of higher learning. The National Research Agenda (NRA) (2021 -2025) seeks to spell out priority areas of research and development and to facilitate resource mobilisation for investment in the priority R&D activities for the country. Zambia never had a consolidated National Research Agenda but several sectoral agendas which were not converged. This led to duplication of efforts and reduced effectiveness of resource application and/or utilisation. The NRA recognises that the management and administration of research in Zambia is undertaken by each Government Ministry responsible for that sector and proposes that one of the key strategies for mobilising resources for R&D will be the pooling of research funds into one pool. Accordingly, the National Science Technology and Innovation policy of 2024 aims to improve investment and funding specifically to enhance funding for R&D; enhance resource mobilisation; and enhance mechanisms for tracking external funding to R&D.

At UNZA, there exists a strategic plan from 2023 to 2027 that focuses on developing a research-intensive university. The plan takes advantage of the national legislative and policy direction to advance the research agenda.

1.3 University of Zambia's mission and objectives for becoming a research-intensive university including a general description of current research and innovation capacity

The strategic direction of the University of Zambia is to reposition itself into a world-class organisation driven by excellence in teaching, research, community service, innovation and industrialisation with a sound financial position. The vision of the University of Zambia is to be a renowned academic institution with a global appeal that is driven by the pursuit of knowledge, research, innovation, and responsiveness to societal needs. Its mission is to provide quality and relevant higher education, research and innovation that shapes the future of society. In pursuit of this vision and mission, the University seeks to focus on the following five strategic objectives: i) enhance intellectual wealth; ii) enhance community engagement and marketing; iii) increase investment in and maintenance of digital and physical infrastructure; iv) turn around the institutional financial performance; and v) streamline and strengthen support functions [1].

The key areas from the pursuit of strategic objectives include teaching and learning, research, innovation and publishing, entrepreneurship and enterprise development, community engagement, recreation and wellness, social responsiveness, communication and marketing, internationalisation and partnerships, digital and physical infrastructure, financial sustainability, management support functions, quality assurance, occupational safety and health and environmental management [1].

The University of Zambia through its former Directorate of Research, Innovation and Development (DRID) now Research and Innovation Hub consisting of three directorates (RIH) has joined a myriad of higher learning institutions globally that have created similar units. The RIH's strategic plan seeks to provide leadership in research administration and management at the University. It also sets out a strategy for the identification and protection of intellectual property that researchers produce. By introducing professionalism in research and innovation management, the university is expected to benefit from increased commercialisation of research outputs. The strategy also outlines activities that lead to increased funding for research through an increase in grants and consultancies over the next five years. This will be facilitated by the establishment of the Grants Office. By using electronic management systems for the documentation of research activities and outputs and by improving communication of research activities, RIH will be able to increase the institution's visibility and improve its ratings on the global stage. The University of Zambia will be required to invest in resources to develop excellence in research. Therefore, investments must be made in research, innovation and development to promote economic growth. If this is done, the institution will stay relevant to its mandate. In responding to Zambia's society needs, the institution is promoting research in climate change, renewable energy and sustainable mining.

Overall, the University of Zambia has positioned itself to be a leader in research, innovation and development in the country, and in doing so aims to enhance collaboration with local, regional and international universities, organisations and industries, expanding its international recognition. In addition, the university has sought to internationalise its programmes and activities and has strengthened its staff and student exchange programmes to maintain world class standards in teaching, research and community service.

2.0 OUTLOOK AND PLAN

2.1 National Development Context

Zambia, a country endowed with vast natural resources and a strategic location in Southern Africa, faces significant developmental challenges that impede its progress toward sustainable growth and poverty reduction. High poverty rates, estimated at 60% in 2022 [4], are compounded by inequality, with rural areas disproportionately affected. Over 75% of the rural population lives in poverty, highlighting stark urban-rural disparities in terms of access to essential services and economic opportunities. The Gini coefficient, which rose from 0.700 to 0.735 between 1996 and 2015, underscores the deepening inequality.

Climate change exacerbates these challenges, as evidenced by the 2024 drought that affected 9.8 million people across 84 districts out of 116 districts [5] (World Bank, 2024). Such climate shocks disrupt agriculture, a sector that employs 60% of the population, and hinder productivity across other sectors, including energy. Zambia's heavy reliance on hydropower, accounting for the majority of its electricity supply, renders its energy infrastructure vulnerable to erratic rainfall patterns.

In addition, Zambia's economy remains heavily dependent on copper exports, which exposes it to global market fluctuations and limits diversification. While the global push for critical minerals, such as copper, cobalt, and nickel, presents opportunities, sustainable mining practices are essential to ensuring long-term economic and environmental benefits.

To address these multifaceted challenges, Zambia's 8th National Development Plan (8NDP) (2023–2026) [6] outlines four strategic development areas to drive Zambia's progress toward sustainable growth. The first area, Economic Transformation and Job Creation, focuses on industrialising key sectors such as mining, agriculture, tourism, and manufacturing, while simultaneously enhancing energy, technology, water supply, infrastructure, skills building and transport logistics to support this transformation. The second area, Human and Social Development, seeks to strengthen Zambia's human capital by investing in quality education and healthcare, recognising their critical role in unlocking broader development potential. Environmental Sustainability, the third focus area, emphasises the implementation of climate adaptation and mitigation measures to build resilience against climate shocks and safeguard natural resources. Lastly, the plan underscores the importance of a good governance environment, highlighting the need for the rule of law and constitutionalism to ensure inclusive and equitable development.

This national development plan is supported by a number of sectoral policies aimed at achieving the country's vision to be a prosperous middle-income country by 2030 [7]. In the mining sector, the government has implemented policies to promote sustainable mining practices, attract investment, and maximise the sector's contribution to the economy. The National Mining Policy (2013) emphasises responsible mining practices that minimize environmental degradation and promote community benefits [8]. Following the global rush for critical minerals, the Zambian government developed the National Critical Minerals Strategy (2024-2028), designed to capitalise on Zambia's abundant mineral resources, including copper and cobalt, to drive economic growth and diversification [9]. Whereas the National Energy Policy (2019) promotes the use of renewable energy sources to diversify Zambia's energy mix, which has historically been dominated by hydropower [10]. To combat climate change, the government has developed a National Policy on Climate Change (2016) which outlines strategies for climate change adaptation and mitigation [11].

Zambia's policies across various sectors demonstrate a strong commitment to achieving sustainable development, addressing the dual challenges of climate change and economic dependence on traditional sectors. The country's policies, which integrate renewable energy, promote climate-smart agriculture, and advance sustainable mining practices, aim to enhance resilience to environmental challenges while fostering inclusive economic growth and social equity.

As a leading research institution, UNZA is uniquely positioned to contribute to addressing these national priorities. UNZA has strategically aligned its research agenda with the country's strategic development priorities, focusing on economic transformation, human and social development, environmental sustainability, and good governance. Through research, policy advocacy, industry partnerships, and active community engagement, UNZA is committed to supporting Zambia's sustainable development goals.

2.2 Objectives

2.2.1 General objective

To strengthen systems for research and innovation, and build capacity at the University of Zambia for high quality scientific research and standards in climate change, sustainable mining and renewable energy.

2.2.2 Specific Objectives

i. To strengthen research support and management through establishment of an Integrated Research and Information Management System (IRIMS) that will enhance research development, output and commercialization of innovations as espoused in the 8NDP.
ii. To establish the grants office that will support mobilisation of grants, capacity building, proposal development support and administrative support to UNZA researchers in line with UNZA 2023-2027 Strategic Plan of enhancing intellectual wealth and financial sustainability.
iii. To build research capacity (individual and institutional research capacity) of UNZA in climate change, renewable energy and sustainable mining (Intellectual wealth in UNZA Strategic Plan; Nationally Determined Contribution, 8NDP, National Green Growth Strategy)
iv. To enhance research activities that address societal problems in areas such as climate change, renewable energy and sustainable mining.
v. To enhance inter/cross disciplinary collaboration and community engagements in providing practical and evidence-based research related to climate change, sustainable mining and renewable energy.

2.3 Expected Results

Objective	Output	Outcome	Impact
1. To strengthen research support and management through IRIMS	IRIMS established for research management support	Improved efficiency in research management Increased research output, visibility and access	Improved university ranking, alignment with University's digital transformation strategic plan Improved inter/cross disciplinary collaborations Enhanced UNZA's

			contribution to national development
2. To establish the grants office	Grants office established	Improved grants management and research Enhanced capacities in grant writing	Increased success rate of grant applications Increased research funding
3. To build research capacity in climate change, renewable energy and sustainable mining	Postdoctoral fellowship and mentorship program established Mandatory PhD courses developed and implemented State of the art equipment acquired Laboratory facilities improved	Enhanced researcher expertise Improved research environment	Enhanced evidence-based contributions of UNZA to national Policy development and practice in climate change, renewable energy and sustainable mining Improved quality of researchers Attract international collaborations
4. To enhance research activities that address societal problems	Research projects initiated and implemented Research output disseminated	Practical sectorial solutions to societal problems adopted Strengthened linkages between UNZA and communities	Improved resilience to climate change Improved adoption of sustainable mining practices Increased adoption and use of renewable energy solutions
5. To enhance inter/cross disciplinary collaborative research	Inter/cross disciplinary research collaborations initiated and implemented within local and/or international institutions Inter/cross disciplinary research teams created Researchers and community/industry networks created	Increased research collaboration networks locally and globally Co-generation of data Enhanced applied action research	Enhanced reputation Improved research quality and cross-pollination of research ideas Enhanced beneficial partnerships/collaborations Improved research relevance

3.0 THREE YEAR PLAN

3.1 Areas of Focus

There are three main areas of focus for the project: Climate Change, Renewable Energy and Sustainable Mining. These focus areas align with Zambia's strategic development areas and represent key opportunities for advancing resilience, inclusive development and ensuring long-term sustainability. Each Focus area is detailed in the subsections below.

Each thematic area will collaborate with one of the following schools: Natural and Applied Sciences, Mines, Agricultural Sciences, Engineering and Humanities and Social Sciences. The School of Agricultural Sciences was established in 1971 and comprises five departments: Agricultural Economics and Extension, Animal Sciences, Food Science and Nutrition, Plant Sciences, and Land Management. The School of Engineering was founded on May 1, 1969, and currently houses the departments of Agricultural Engineering, Civil and Environmental Engineering, Electrical and Electronic Engineering, Geomatic Engineering, and Mechanical Engineering. The School of Natural and Applied Sciences, one of the three original schools established when the University opened in 1966 alongside the Schools of Education and Humanities and Social Sciences, now includes six departments: Biological Sciences, Chemistry, Computer Science, Geography and Environmental Studies, Mathematics and Statistics, and Physics. The School of Mines was established in 1973 with three core departments: Geology, Mining Engineering, Metallurgy and Mineral Processing, which focus on the exploration, extraction, and processing of mineral resources—a sector that remains vital to Zambia's economy. The School of Humanities and Social Sciences, a foundational School at the University, has been offering degree programs since the University commenced teaching in March 1966. It features a diverse range of departments, including discipline-specific ones like Economics, Philosophy, and Psychology; field-focused departments such as Political and Administrative Studies and Social Development Studies; and interdisciplinary departments like Development Studies and Mass Communication. Additional areas of study include English, French, Geography, History, Historical and Archaeological Studies, Media and Communication Studies, Literature and Languages, Philosophy and Ethics, Demography, Population Sciences, Monitoring and Evaluation, Psychology, Social Work, and Sociology. All the aforementioned schools provide academic programs at the bachelor's, master's, and PhD levels.

The schools have a diverse and skilled faculty with expertise in various subject areas relevant to their respective fields, holding qualifications ranging from Master's to PhD degrees. They are further supported by essential administrative and technical staff. However, the schools still face a shortage of adequate faculty members, which underscores the importance of Post-doctoral and Mentorship programs in ensuring the institution's sustainability and growth. Tables 1 to 3 show statistics for staff, publications, enrolments and graduations from 2022 to 2024.

Table 1: Staff statistics and Publications

Year	School	Professors (M)	Professors (F)	Senior Lecturers (F)	Senior Lecturers (M)	Lecturers (F)	Lecturers (M)	Total Lecturers	Publications
2024	Natural and Applied Sciences	7	0	3	10	15	67	102	38
	Agricultural Sciences	8	1	4	11	25	16	65	41
	Mines	2	0	0	2	4	14	22	26
	Engineering	5	0	0	7	2	58	72	47
2023	Natural and Applied Sciences	8	0	3	11	15	67	104	8
	Agricultural Sciences	6	0	3	12	19	23	63	8
	Mines	3	0	0	3	1	15	22	18
	Engineering	4	0	0	9	2	62	77	15
2022	Natural and Applied Sciences	8	0	3	11	15	67	104	14
	Agricultural Sciences	6	0	3	9	18	28	64	4
	Mines	3	0	1	4	0	13	21	10
	Engineering	4	0	0	6	2	65	77	20

Table 2: Student Statistics

Year	School	Undergraduates	Masters Student	PhD Students(F+M)	Post-Doctoral Fellows
2024	Natural and Applied Sciences	3000	58	12	2
	Agricultural Sciences	650	68	41	1
	Mines	820	127	20	0
	Engineering	1500	422	49	0
2023	Natural and Applied Sciences	2000	180	27	0
	Agricultural Sciences	650	64	22	2
	Mines	300	150	17	0
	Engineering	1400	95	14	0
2022	Natural and Applied Sciences	2000	181	27	0
	Agricultural Sciences	500	64	22	1

	Mines	300	102	17	0
	Engineering	1400	444	34	1

Table 3: Graduation Statistics

School	Category	2022	2023	2024
Natural and Applied Sciences	**Postgraduate**			
	PhD	1	0	2
	Masters	24	30	5
	Undergraduate			
	Male	52	59	86
	Female	34	40	61
Agricultural Sciences	**Postgraduate**			
	PhD	3	1	2
	Masters	4	9	11
	Undergraduate			
	Male	38	33	31
	Female	38	25	33
Mines	**Postgraduate**			
	PhD	0	3	3
	Masters	5	17	5
	Undergraduate			
	Male	30	21	26
	Female	2	2	6
Engineering	**Postgraduate**			
	PhD	0	8	5
	Masters	28	57	52
	Undergraduate			
	Male	91	89	84
	Female	13	26	23

3.1.1 Climate Change

3.1.1.1 Rationale

Zambia is highly exposed to climate risks and has recorded an increase in extreme weather events such as droughts, floods, and heatwaves, with adverse effects across all sectors of the economy. It is thus imperative to mainstream mitigation and adaptation to climate change in all sectors. The worst drought of 2023/24 farming season in the last 40 years led to declaration of the drought as a national disaster, increased food and water insecurity, increased electricity deficit and government expenditure on addressing the hunger situation. The need to build adaptive capacity and climate change resilience agricultural production systems for sustained food security, economic development and social inclusion cannot be overemphasized.

3.1.1.2 Activities

The activities shall be done under the following two research thematic areas:

i) Climate Compatible Growth

Enhancing sectorial transitioning to the Green economy shall be the overarching focus for the research activities led by the School of Natural Sciences with participation of schools of Agricultural Sciences, and Humanities and Social Sciences.

Year 1-Promotion of circular economy at the University of Zambia

1. Capacity and needs assessment at UNZA
2. Development of an engagement strategy
3. Development of the University of Zambia Environmental Policy, Strategy and Management Plan
4. Capacity building for the university community on circular economy
5. Developing a business model for solid waste management
6. Piloting of the solid waste management business model

Year 2: Research in climate smart agriculture

1. Artificial Intelligence (AI) and machine learning short course training for climate change studies.
2. Enhanced research in climate smart agriculture and adaptation.
3. Field work to collection of information on adaptive measures and their effects in agriculture
4. Analysis of samples and data

Year 3: Continuation of climate change accounting in agriculture

1. Production of an open access dataset for climate change and agriculture
2. Co-evaluation of mitigation and adaptation measures in agriculture
3. Development of strategies of enhancing climate resilience (mitigation and adaptation)
4. Publication, policy dialogues and symposium
5. AI and machine learning in climate change mitigation and adaptation

ii) Climate Change and Food Systems

Building resilience in Zambian agricultural productivity food systems shall be the overarching focus of the research activities led by the School of Agricultural Sciences in collaboration with schools of natural sciences, humanities and social sciences and school of veterinary medicine.

Year 1

1. Stakeholder identification and engagement
2. Scoping review of climate change mitigation and adaptation measures to get gaps and lessons learnt
3. Social learning labs at provincial and national level stakeholders for validation on gaps and lessons learnt from previous interventions
4. Social learning labs for co-creation of solutions

5. Analysis of data
6. Write-up sessions

Year 2

1. Design of the research protocols in line with results from year 1
2. Fieldwork or, and establishment of experiments

Year 3

1. Analysis of data
2. Write-up sessions
3. Publication, policy dialogues and symposium/conference

3.1.1.3 Human resource

The University of Zambia has experts in agriculture, animal husbandry, climate science, mitigation and adaptation measures, agriculture engineering and social sciences. However, the University of Zambia will need to collaborate with experts from Swedish Universities in climate change research such as carbon accounting, to enhance certification of Zambian experts and carbon projects and sustainable food systems and on Artificial Intelligence and machine learning in climate change mitigation and adaptation. Swedish partners could support UNZA to develop a course and train staff and postdoctoral fellows on how to use AI to model different adaptation and mitigation strategies. Furthermore, partnership with Swedish partners will also be required in designing research projects, development of curriculum and setting up procurement and maintenance plans for equipment. Over a period of three years, a minimum of 4 postdoctoral candidates are targeted to be trained.

3.1.2 Advancing Renewable Energy Research and Capacity Building at UNZA: A Strategic Plan for Zambia's Sustainable Energy Future

3.1.2.1 Rationale

Zambia's energy sector is confronted with significant challenges, with only 53.6% of its population having access to electricity and rural regions trailing far behind urban centers. The country's dependence on hydropower exposes it to risks from climate variability, highlighting the need to diversify into other renewable energy sources. Solar mini-grids, home systems, and energy storage solutions offer significant potential but are not fully utilised due to issues such as poor design, inadequate business models, and problems with quality assurance.

This project aims to fill these gaps by fostering research and innovation in renewable energy technologies, building local capacity, and encouraging sustainable adoption. By tapping into Zambia's plentiful raw materials for lithium batteries and supporting interdisciplinary collaboration, the initiative seeks to facilitate a green energy transition, enhance socio-economic conditions, and establish UNZA as a regional leader in renewable energy research.

3.1.2.2 Activities

Thematic areas

The project on renewable energy has five thematic areas which will draw participation from School of Natural Sciences, School of Engineering, School of Humanities and Social Sciences, School of Agricultural Sciences, School of Mines and collaborators from Sweden.

Theme 1: Renewable Energy Systems and Planning

The Department of Pure and Applied Chemistry and the Department of Agricultural Engineering will collaborate on research in biogas technology. The Department of Pure and Applied Physics, through the Solar Energy Center of Excellence, will oversee PV testing activities. Meanwhile, the Department of Mathematics will focus on research into optimizing renewable energy (RE) integration into the grid.

Research Focus:

i. Development and characterization of biogas technology, including Combined Heat and Power (CHP) systems.
ii. Energy modelling, planning, and optimization of RE and grid integration.
iii. Quality assurance services for renewable energy technologies- Establish a state-of-the-art facility for quality assurance of solar equipment, enhancing reliability and standards in the Zambian market.

Theme 2: Solar Energy Materials

The Department of Pure and Applied Physics, along with the Department of Pure and Applied Chemistry, has been actively conducting research on solar energy materials, supported by Sida's International Science Programme. The current proposal builds on these initial investments and aims to strengthen research infrastructure and boost output.

Research Focus:

i. Development of advanced solar materials, including organic solar cells, perovskites, and tandem solar cells.
ii. Characterization of solar energy materials to enhance efficiency.

Theme 3: Energy Storage Systems and Materials

This research theme will be a collaborative effort involving the Department of Pure and Applied Chemistry, the School of Mines, the Department of Civil and Environmental Engineering, the Department of Electrical and Electronic Engineering, and the Department of Pure and Applied Physics.

Zambia's rich reserves of raw materials for lithium batteries highlight the need to build capacity in battery development. Additionally, the recurrent droughts affecting the country have threatened hydroelectric power generation. Given Zambia's abundant solar energy resources, this theme will explore the feasibility of water reuse at selected hydropower stations through a solar-powered pump-back method.

Research Focus:

i. Development and characterization of lithium batteries and super-capacitor materials.
ii. Enhance research on Health and fire safety of RE System (Batteries and PVs)
iii. Feasibility studies on hybrid renewable energy systems, such as pumped hydro storage.

Theme 4: Renewable Energy in Agriculture/Water Nexus

The lack of clear and adaptive business models for renewable energy projects has hindered investment, including opportunities for potential independent power producers. Additionally, there is insufficient capacity-building within communities to maximize the benefits of solar projects in underserved areas.

To address these challenges, demonstration projects with well-defined business models will be implemented. This initiative will involve the School of Agricultural Sciences, the School of Engineering, the School of Natural Sciences, and the School of Humanities and Social Sciences, ensuring a comprehensive and interdisciplinary approach.

Research Focus:

i. Demonstration projects integrating renewable energy into agriculture and water management systems.
ii. Development of renewable energy business models and socio-technical studies on technology acceptance.

Theme 5: Capacity building and Research Enhancement

Sustaining these research projects will require highly trained personnel and skilled researchers.

Focus:

i. Develop course content and conduct advanced training programmes for and technical staff in RE technologies
ii. Launch postdoctoral fellowships to attract and develop high-caliber researchers.

3.2.6 Time Frame and Sequencing

Year 1: Building Foundations

i. Procure equipment and upgrade laboratory facilities.
ii. Build collaborations
iii. Conduct baseline studies and feasibility assessments for RE deployment.

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Year 2: Optimization and Scaling

i. Launch developed programmes
ii. Host postdoc fellows/ international collaborators and conduct capacity-building workshops.
iii. Initiate research projects, enhance and optimise existing research: biogas technology, PV materials, energy modelling, battery research, RE fire safety research, techno-economic feasibility of hybrid systems, and business models

Year 3: Deployment and Impact

i. Implement demonstration projects integrating RE into agriculture and water systems.
ii. Validate business models and conduct stakeholder workshops.
iii. Disseminate results through publication, policy briefs, social media and finalise capacity-building initiatives.

3.2.1.3 Human Resource

The University of Zambia has academic staff with expertise in the area of renewable energies drawn from different departments. In 2006, the University of Zambia introduced a Master of Science in Sustainable Energy Engineering through e-learning in collaboration with the Royal Institute of Technology (KTH) of Sweden. In 2014, a Master of Engineering in Renewable Energy was introduced in the School of Engineering. The University is home to a Centre of Excellence in Solar Energy. A multi-disciplinary field team would be created with

a team leader heading the listed six thematic areas. Members of the group will be drawn from the School of Natural and Applied Sciences (Department of Physics) and School of Engineering (Agricultural Engineering, Electrical Engineering and Mechanical Engineering and School of Mines). The group will have a social scientist that will be the social engineer to raise awareness of the technology, contribute in the development of business models and measure the impact of RE deployment in the demonstration area. Each team leader will work with a team of researchers currently employed by UNZA and will also include post-doctoral researchers. However, the University of Zambia will need to collaborate with Sida related Universities experts in renewable energy. Further partnership with Swedish partners will be required in designing research projects, development of curriculum and setting up procurement and maintenance plans for equipment. Over a period of three years, a minimum of 4 postdoctoral candidates are targeted to be trained.

3.1.3 Sustainable mining

3.1.3.1 Rationale

The mining industry has been a key player in Zambia's economic growth in the last century. Much of Zambia's mining industry growth is attributed to the large-scale mining investments made by international corporations to exploit mostly copper and cobalt. However, the industry also has been associated with various negative social and environmental impacts caused by unsustainable practices. Notably, one of the country's mining districts, Kabwe is named among the worst contaminated hot spots in Africa, owing to the substantial legacy pollution linked to lead and zinc mining which has persisted 30 years after closure of the mines as the sources of the contaminants remain active [12]. Most recently in 2024, the Zambian government announced ambitious plans to triple the country's copper production to 3 million tonnes annually by 2031. While this may spur increased investments in the sector, it may also exacerbate the environmental and social issues if there are no corresponding investments in sustainable mining practices. Furthermore, the emerging Artisanal and Small-Scale Mining (ASM) sector has become increasingly important (AUC, 2009) in mining of base metals, semi-precious minerals, and critical raw materials such as the battery raw materials. Despite the importance of ASMs, the sector is faced with:

- Limited geological information which leads to blind mining, and consequently causes increased land degradation, pollution and contaminations of the environment, water bodies, and the agricultural lands.
- Lack of technological innovations and use of simple tools and unsafe methods which lead to inefficiencies, wastage, and environmentally harmful extraction and processing methods.
- Limited or no value addition, leading to the export of unprocessed or semi-processed mineral concentrates. This causes the loss of potential economic benefits and denies local communities the opportunity to participate in higher-value activities

It is therefore essential to develop research skills in sustainable mining to support the ASM sector and harness global opportunities arising from new developments such as the energy transition.

The objective of this concept is to enhance human and research capacity in sustainable

mining through knowledge creation, data availability, education, and awareness. This will foster clean and greener technological innovations in mineral exploration, mining, beneficiation processes, and sustainable environmental remediation.

Research Questions

- In what geological settings do rocks which host critical raw materials and associated minerals occur, and what are the geological controls of their occurrence?
- What methods can be used to effectively explore for these minerals?
- What innovative technologies can be used to efficiently mine and process them?
- What are the potential environmental and social impacts of mining and processing these materials?
- What is the status of value addition of critical raw materials and how can local SMEs and communities be involved?

3.3.4 Human resources

The School of Mines has three departments and 22 academic staff who are qualified in various disciplines of Geosciences, Metallurgy and Mineral Processing, and Mining Engineering, which represent the three critical competencies involved in the search for ores, their recovery from the ground, and the extraction of metals from the ores. An interdisciplinary team will be drawn from the three departments in the school, in collaboration with the Schools of Engineering, Natural Sciences and Humanities and Social Sciences. Key research personnel will include post-doctoral fellows, masters and PhD students enrolled at the university. The school will further seek to collaborate with other industry experts and Swedish universities to leverage resources, co-create and test innovative ideas in thematic areas such as sustainable mining which will include research on processing of critical minerals for electric vehicle batteries manufacturing, development of remediation techniques. Further partnership with Swedish partners will be required in designing research projects, development of curriculum and setting up procurement and maintenance plans for equipment. A minimum of 4 postdoctoral candidates are targeted to be trained over the three year period.

3.1.2.3 Activities

The project will be conducted in a phased manner with regular reviews to permit timely adaptations to prevailing conditions.

Implementation Plan

Year 1: Inception

i. Establish research teams to focus on the various aspects of geology and sustainable mining
ii. Reconnaissance field visits and sampling to investigate the mineralogical and geochemical characteristics of rocks and minerals from selected sites
iii. Identify and establish collaborations with other institutions, the mining industry, and engagement of host communities to raise awareness in sustainable mining practices.

Year 2: Operations and data sharing

i. Commencement of data collection (social surveys, geological and biophysical sampling)
ii. Lab works (Mineralogical, chemical and metallurgical experiments)
iii. Data processing and analysis
iv. Product development

v. Drafting of research manuscripts

Year 3: Assessment

i. Validation and dissemination of research outputs in journal publications and communities
ii. Validation and testing
iii. Assessments of the project performance
iv. Development of strategies for sustainability

3.1.4 Integrated Research Information Management System

3.1.4.1 Rationale

An integrated research information management system (IRIMS) is crucial for enhancing the efficiency, transparency, and effectiveness of research activities within an institution. By centralising data related to research projects, publications, funding, and collaborations, such a system enables seamless access to information thereby reducing duplication of efforts and administrative burdens. The absence of an IRIMS at UNZA has contributed to inefficiency in research and grant management. Consequently, there is limited access to essential information on grants and research opportunities. Evidence based decision making for policy and development is not adequate. Further, the Lack of IRIMS has contributed to low university ranking and low level of inter/cross disciplinary collaborations and limited UNZA's contribution to National Development. Furthermore, there have been limitations in showcasing UNZA's research outputs. It is therefore important that an IRIMS be developed by UNZA to ensure that all the constituent parts of research (input and outputs) are automated. The IRIMS will increase the visibility of the institution, improve its ratings on the global stage, and as such actualise UNZA's vision of (2023-2027) of becoming a world class institution driven by excellence in teaching, research and community service.

UNZA has limited capacity to develop systems such as an IRIMS. Currently at DRID we have one person working with Dspace CRIS (data Input) who will be in charge of the IRIMS. However, the university has an IT support Unit but it is not sufficient to address the needs of DRID and the university with regard to IRIMS. Furthermore, the university has good internet infrastructure which can run IRIMS efficiently.

With support from Sida, the University intends to hire/procure a consultant and additional computer programmers to develop the system. Preferably, a consultant from Sida cooperating universities in Africa or Sweden will be hired to provide technical support for the development of an IRIMS. The programmers will supplement the efforts of the few available programmers within UNZA and this will expedite the process of developing the system.

3.3.1 Activities

Working with Swedish partners the support from Sida will go towards the programme implementation following a phased approach. The stages are as follows:

Phase 1: Needs Assessment and Planning

i. Conduct consultations with key stakeholders, including researchers, administrators, and Information Technology (IT) staff.
ii. Analyse existing systems and identify gaps and integration needs.
iii. Define functional and non-functional requirements for the IRIMS.

Phase 2: System Design and Development

i. Develop a modular system architecture to ensure scalability and flexibility.

ii. Build core modules, including researcher profiles, project management, and compliance tools.
iii. Establish data security protocols to protect sensitive research information.

Phase 3: Testing and Deployment

i. Conduct usability testing with researchers and administrative staff.
ii. Address feedback to ensure the system meets user needs.
iii. Deploy the system in a phased approach, starting with high-priority modules.

Phase 4: Training and Support

i. Develop user training materials and conduct workshops for researchers and administrators.
ii. Establish a helpdesk for ongoing technical support and issue resolution.

Table 2: IRIMS Implementation Timeline

Phase	Duration	Timeline
Needs Assessment, Planning, and Requirements specification	3 months	Month 1–3
System Design & Development	5 months	Month 4–8
Testing, Training & Deployment	2 months	Month 9–10
Support and Training	26 months	Month 11–36

3.1.5 Mentorship, Supervision and mandatory PhD Courses

3.1.5.1 Rationale

3.1.5.1.1 Mentorship and Supervision

The University of Zambia, for years, has had no formal programme for induction and mentorship. Newly recruited members of staff are left on their own to learn how to conduct teaching, research and supervision or are informally guided by willing colleagues. This has significantly contributed to low quality teaching, learning, supervision and research at UNZA. Training of supervisors and mentors at the University of Zambia will enhance supervision of postgraduate students' research work and mentoring of newly recruited staff. It will help strengthen decision-making around academic persistence and degree attainment, improve retention of junior faculty in higher education and enhance mentee productivity, self-efficacy and career satisfaction. Additionally, the training will inculcate critical thinking and creation of innovations that meet societal needs. Training of supervisors will equip them with the skills necessary for mentoring and guiding postgraduate students in their research journeys. The aim of the training will be to equip supervisors with a crosscutting set of competencies focusing on research, academic and career mentorship. Faculty will learn evidence-based practices to provide academic and personal support to junior staff and students through effective mentorship and supervision. Activities such as development of modules and capacity building training workshops will be conducted for mentorship and supervision. The three-day training will be conducted quarterly in a year with 80 Lecturers being trained per year from the four schools. There are a total of 257 potential participants, of which 29 are professors.

3.1.5.1.2 Mandatory PhD Courses

The university has developed a structured doctoral curriculum framework which has

standardized competencies for all PhD students at the University of Zambia but has not been implemented yet. These competencies will be delivered through mandatory, elective and discipline-specific courses to ensure the students are grounded in critical thinking enabling a smooth transition to postdoctoral research. Four mandatory courses have been developed which include:

i. PHD 9911 Philosophy, Ethics and Integrity in Science
ii. PHD 9901 Research Methodology
iii. PHD 9905 Scientific Writing and Communication
iv. PHD 9915 Leadership, Management and Governance

The four courses will be run twice a year for 300 students per year. Upon successful completion of their respective PhD programmes, students will be able to

i. Create, conceptualise, design and implement an investigation for the generation of new knowledge and/or adjust the design of the investigation in the light of unforeseen problems.
ii. Employ expert judgements on complex issues in specialized fields, often in the absence of complete data, and communicate ideas and conclusions clearly and effectively to specialist and non-specialist audiences.
iii. Undertake research and development at an advanced level, contributing substantially to the development of new techniques, ideas or approaches.
iv. Employ qualities, ethics and transferable skills necessary for utilisation in varied contexts requiring the exercise of full personal responsibility and largely autonomous initiative in complex and unpredictable situations.

3.1.5.2 Activities

Working with Swedish University partners the support from Sida will go towards program implementation as follows:

Year 1

i. Engagement with leading Swedish universities on Mentorship, Postgraduate Supervision, PhD and Postdoctoral Training.
ii. Exchange visits between UNZA and Swedish universities to discuss priority research areas and the review of mandatory PhD courses
iii. Review of PhD Mandatory courses (1 month)
iv. Delivery of Courses to PhD Students
v. Development of mentorship and supervision training (1 month)
vi. Training of Trainers by Swedish University Partners
vii. Training of supervisors and mentors on supervision of postgraduate students' research work

Year 2

i. Commencement of structured mentorship programme and mandatory PhD courses
ii. Training of supervisors on online facilitation for undergraduate and postgraduate training in conjunction with Swedish universities
iii. Delivery of mandatory courses to PhD Students in conjunction with Swedish universities
iv. Implementation of mentorship and supervision training in conjunction with Swedish universities
v. Training of supervisors and mentors on supervision of postgraduate students'

research work in conjunction with Swedish universities

Year 3

i. Delivery of Courses to PhD Students in conjunction with Swedish universities.
ii. Implementation of mentorship and supervision training in conjunction with Swedish universities .
iii. Training of supervisors and mentors on supervision of postgraduate students' research work in conjunction with Swedish universities.

Human Resources

The University of Zambia has senior academic members of staff with expertise in various fields. The staff will be drawn from the various schools to form a team that will provide mentorship to junior members of staff, PG students and postdoctoral candidates. In partnership with Swedish Universities, the identified senior academic members of staff will spearhead the training activities including development of modules, mentorship and supervision. The University intends to collaborate with Swedish universities to train the trainers (ToTs) and the mentees as well as reviewing of PhD curricular/courses and the development of training modules.

Currently, the University of Zambia does not have a structured mentorship programme. This proposed collaboration with Swedish universities which are well established in mentorship programmes and postgraduate training is expected to actualise the establishment of such a programme and to enhance supervision of postgraduate students' research work and mentoring of newly recruited staff.

3.1.6 Establishing a Grants Office at the Directorate of Research and Development

3.1.6.1 Rationale

Although Africa represents 12.5 percent of the world's population, its input to global scientific research is merely 2.4 percent. The continent encounters numerous challenges that can be effectively solved using solutions derived from internally generated research. This motivates African researchers to pursue funded scientific research and come up with home grown solutions to the challenges facing their continent.

The University of Zambia, the country's premier institution of education, has been leading the way in research and innovation since its establishment. By its nature, the University of Zambia stands out as a secure and efficient institution for optimal grant funds utilization.

The creation of this office will enable capacity building among grant managers and researchers, mentoring them how to find, win, and manage grants. The Centre will present University of Zambia researchers with a one-stop place for identifying grant opportunities from many different funding sources and receive technical assistance covering the pre and post award phases.

Rationale - Significance of the Grants and Research Management Office

Many times, at the university of Zambia researchers end up knowing about grant opportunities late with little time to prepare, resulting in missing opportunities for submitting applications. Further, the fragmented and individualistic approach to research has proven to be detrimental. The establishment and implementation of the Grants and Research Management Office will avail financial and policy guidance to cure these factors.

Establishing and implementing a Grants and Research Management office successfully, will introduce confidence among grant institutions resulting in increased success in grant application.

The University of Zambia has already designated space and assigned personnel to manage the Grants and Research Management office. The Grants and Research Management Office operates under the Director of Research and Innovation. The team consists of two (2) Grants Officers—one responsible for Pre-award activities and the other for Post-award tasks—alongside one (1) Ethics & Affiliation Officer, one (1) Compliance & RIMS Officer, and one (1) Research Information & Communications Officer. Additionally, the office is supported by one (1) Research Administration & Support Manager, one (1) Business & Consultancy Manager, one (1) Research Production & Intelligence Manager and two (2) Accountants. The entire office is supervised by the Assistant Director for Research Support and Grants.

Although we have staff assigned to the grants office they do not have adequate skills in grants management. In order to achieve its objectives and ensure the office functions efficiently and effectively, support and collaboration with Swedish universities are essential in the following areas.

1. **Support on the setting up of the Grants Management Portfolio**
2. **Capacity Building for Grants and Research Management staff on**
    - Grants Management
    - Understanding the stakeholder's roles and Responsibilities
    - Contracts and Sub Award Management
    - Financial Management and Compliance
    - Project Management and Reporting
    - Risk Mitigation when researchers apply for funding
    - Monitoring and evaluation of performance metrics
    - Training of Trainers by Swedish University Partners for grant office staff and Assistant Deans for Research and Postgraduate

3. **Capacity Building and Skills Development for Researchers**
    - Training of Trainers by Swedish University Partners
    - Training of champions in the schools
    - Build capacity for Researchers in grant writing and proposal development techniques.
    - To impart skills in researchers on how to write detailed and error-free budgets for grant proposals.

By focusing on these training areas and collaborations, staff from the grants office will develop the required skills to effectively secure and manage grants. The grants office will encourage the participation of female researchers due to the low numbers of female researchers who are currently participating in grant applications.

4.0 QUALITY ASSURANCE

4.1 Institutional Framework for Quality Assurance (QA)

At institutional level, the University of Zambia has a comprehensive internal Quality Assurance Framework which serves as a guide in linking the many operational and developmental processes in university functions in order for the University to realize its vision and mission statements. With its guidelines and processes on all functions and services

of the University such as governance, management, teaching and learning, research, and community outreach, the Quality Assurance Framework (QAF) is the fundamental tool for the promotion, monitoring and evaluation of quality in the University. It prescribes procedures for key activities such as programme development and review using self-assessment, appointment of examiners, preparation of examinations and moderation, grading and classification of degrees. The University implements the provisions of the Framework through a centralized Quality Assurance Directorate (QAD) which is overseen by the Vice Chancellor's office. QAD reports to the Senate through the Quality Assurance Committee of Senate (QAC) co-chaired by the Deputy Vice Chancellor, Academic and Deputy Vice Chancellor, Research and Innovation. The University has also established Quality Circles in all academic units and non-academic units which are overseen by QAD and are responsible for the coordination of quality assurance activities in academic units. Specifically to all postgraduate programmes, the university has in place postgraduate regulations as approved by the Senate and overseen by the Senate Research Board. These regulations provide guidance on admissions, research, supervision and selection of examiners. The QA is guided by the Inputs-Processes-Outputs-Outcomes Model.

Table 5: UNZA Inputs-Processes-Outputs-Outcomes Model

	Inputs	**Processes**	**Outputs**	**Outcome**
Students	Student demographics, Students entry qualifications	Educational programmes, services offered	Student grades, graduation rates, employment statistics, credit hours generated	Student l values de
Academic staff	Expertise, experience, skills	Teaching loads, class sizes, services/support offered	Publication numbers, grants generated, credit hours generated	Publicatic staff contributi specialisa
	Campus	Policies,	Statistics on resource	Contribut

4.2 Monitoring and evaluation of research

Monitoring and evaluation of research is embedded in the Research Policy approved by the Senate and University Council. It is implemented through the Research Board, a committee of the Senate. The Research Board is chaired by the Vice Chancellor/Deputy VC R & I. The quality and contributions of staff research are evaluated annually in all departments as part of self-assessment procedures. The Research Audit, Implementation Monitoring Committee (RAIMC) of the Research Board provides the evaluation system with the appropriate instruments which are used for the evaluation: a) ensuring consistency in the research activities of the University; b) ensuring adherence to research methodology; c) ensuring correct use of research resources; d) ensuring compliance to good research standards; e) enforcement of quality control; f) ensuring that research progress is constantly reported; and) ensuring that student supervisors do their work of supervision as per university regulations.

4.3. Monitoring and evaluation of research training

A combination of different measurement metrics, both quantitative and qualitative, are used to monitor and evaluate the research training in UNZA. The programme will use already established structures for reporting on training; unless these M & E metrics require strengthening.

4.4 Quality of education and research is upheld,

Quality in education is reflected in policy documents such as the Teaching and Learning Policy which encapsulates an enabling institutional environment in which quality teaching and learning can flourish.

4.5 Research culture

Since inception UNZA has pursued a robust research culture that is anchored in excellence and is reflective of societal needs and encapsulated in the UNZA Research Policy as the 'promotion of a sustainable, focused and dynamic environment that fosters efficient and effective research and contributing to social and economic development and at the same time assuring academic freedom'. It forms one of the three foundation pillars of UNZA's contribution to society in addition to teaching and community engagement; with emphasis on innovation. In doing so, UNZA has made investments in research training, ICT, libraries, laboratories, albeit not to desired levels in order to provide a support environment in which research can flourish. It has made investment in internet access and institutional repositories to promote open access to publications. These are accompanied by policies such as ICT, Open Data and Open Science, Scholarly Communications and Publishing, and Research and Intellectual Property Rights (IPR) etc., all aimed at providing guiding governance frameworks for the university community.

Individual researcher behaviour through the academic promotions policy where researchers are assessed on a combination of attributes such as teaching, peer reviewed research publications, grant writing and financial mobilisation, and community engagement. Enhancement of research capacity, both at institutional and individual levels; is achieved through the provision of undergraduate, postgraduate degrees that have components of research. In the process, both students and lecturers gain research skills through learning, mentorship and supervision. UNZA Press is the publishing press of the University, publishing both journals and books. UNZA promotes and encourages dissemination of its research outputs in different publication outlets, both locally and internationally. UNZA publishes a total of 23 peer reviewed journals through its online journal publishing platform as open access and does not charge any article publication fees. Additionally, collaborative research is pursued vigorously, and in this regard the UNZA has over the years collaborated with institutions and researchers both locally and internationally. There are currently more than 400 research collaborations across the university. Further, the university provides seed funding through the DRID encouraging young researchers to participate in research.

4.6 Research Ethics and Integrity

These are governed by various legal, ethical and regulatory instruments, at national, regional and international levels relevant to enhancement of research integrity. Within the university, the UNZA Disciplinary Code of Conduct stipulates that non-compliance with UNZA research regulations attracts a penalty of dismissal from employment; and the University of Zambia Research Ethics Committees (UNZA RECs) responsible for reviewing research proposals for research ethical compliance. There are 3 RECs: (a) Biomedical Research Ethics Committee; (b) Natural and Applied Sciences Research Ethics Committee; and (c)

Humanities and Social Sciences Research Ethics Committee, reflecting broadly the multidisciplinary nature of UNZA. The RECs mandate are not restricted to UNZA researchers and students only, but also cover collaborative research with other institutions. In the case of a collaborative research project involving one or more foreign institutions, ethical approval is sought both from UNZA where the research will be carried out and from the Institutional Review Boards (IRB) of the collaborating institutions.

5.0 BUDGET

Table 6: Programme Budget

Activity No.	Activity	Total	Total
		US$	SKR
1	**Establishment of Grants office**	**300,000.00**	3370786.517
2	**Establishment of an Integrated Research Information Management System**	**500,000.00**	5617977.528
3	**Renewable Energy**		
	Renewable Energy Systems and Planning	200,000	2247191.011
	Functional Solar Energy Materials	350,000	3932584.27
	Energy Storage Systems and Materials	250,000	2808988.764
	RE in Agriculture/Water Nexus	250,000	2808988.764
	Curriculum Development and Capacity building	90,000	1011235.955
	Sub Total	**1,140,000**	12808988.76
4	**Climate Change**		
	Equipment, software and maintenance	550000	6179775.281
	Fieldwork and laboratory condition	350000	3932584.27
	Meetings, publications, Upskilling of team members and Symposium/Conferences	130000	1460674.157
	Consumables (stationery, Communication, Printing, etc.)	100000	1123595.506
	Sub Total	**1130000**	12696629.21
5	**Sustainable Mining**		
	Laboratory upgrades	50,000	561797.7528
	Field work activities and consumables	140,000	1573033.708
	Lab Equipment and Maintenance	924,500	10387640.45
	Conference participation and journal publications	31,100	349438.2022
	Sub Total	**1,145,600**	12871910.11
6	**Mentorship and Supervision**		
	Development of mentorship and supervision modules (14 Days)	50000	561797.7528
	Delivery of Training (Quarterly for 3 years)	100000	1123595.506
	Sub Total	**150000**	1685393.258
7	**Development of PhD Mandatory Courses**		
	Review of Ph.D. Courses	20000	224719.1011
	Delivery of courses	150000	1685393.258
	Sub Total	**170000**	1910112.36
	TOTAL	**4,535,600.00**	**50,961,797.75**

5.0 SUSTAINABILITY

The University of Zambia has policies and strategies that ensure continuation of programmes. This project is at the centre of the interface of excellence in learning, teaching, research and community service of UNZA and as a contributor to the attainment of '*Socio-economic Transformation for Improved Livelihoods'* by Zambia as espoused in the 8NDP. Sustainability entails the ability to achieve desired outcomes and the ability to continue activities after the project funding period. The project will operate with a mandate of advancing research and innovation through postdoctoral training, mentorship, mandatory PhD courses and research systems. The capacity developed through this programme will only grow from the initial investment by Sida; for in today's competitive world, building research capacity is also key to survival as a higher learning institution.

The university has a very robust human resource development programme; with an established office that is responsible for training and development at the institution. This feeds very well into the programme's objectives of development research capacity through postdoctoral fellowship training as the persons targeted are already full time members of staff of the University. Strengthening PhD Courses and Mentorship will enhance the skills of the pools of potential early researchers that UNZA could potentially recruit as it enriches its research staff.

University management has already shown support for the programme through their commitment letters. The programme will be integrated in the overall university plans so that it can benefit from the University funding. Ultimately, in order to ensure sustainability, all programmes will have been integrated and mainstreamed into the institution's policies, programmes, budgets, operations and procedures. This budget will support and cover all aspects of the programme including equipment maintenance.

6.0 PARTNER AND DONOR COORDINATION

Partner and donor coordination shall be governed through a Grant Contract or Memorandum of Understanding (MOU) signed by all partners: Sida, Swedish Partner Universities (SPU) and UNZA. The agreement shall specify the roles, responsibilities, expectations and obligations of each party ensuring alignment and effective collaboration throughout the programmes' implementation. This will also facilitate monitoring and evaluation of programme objectives.

7.0 CROSS CUTTING ASPECTS

The cross-cutting issues shall be incorporated into programme design and implementation and address intersectional factors under each thematic areas such as gender, culture, and behaviours, persons with disabilities, rurality and their impact on poverty reduction. The programme will draw particular attention to the following.

7.1 Environmental Impact

A Green environment is among the core values of the University of Zambia; in which UNZA is fostering a green environment by undertaking promotion activities such as research that are aimed at mitigating the impact of climate change. To this effect, the University is expected to harness these opportunities by applying its capacity to undertake various environmental activities such as conducting water analysis, engineering, testing and fostering a green environment. The project will build on the above activities by taking cognisance of environmental issues throughout the programme life cycle.

7.2 Gender Equality

The need to overcome existing gender inequalities in agriculture, and in addressing issues of climate change, sustainable mining and renewable energy is paramount in Zambia. Yet, research capacity in gender informed approaches to addressing these issues is limited. A holistic approach to capacity development in the key thematic areas of focus by the project is essential to address the pressing challenges of gender parity and social inclusion, especially as regards issues climate change, renewable energy and sustainable mining. Gender parity and social inclusion will be paramount to the project ensuring that during the project period, equal opportunities, rights, and responsibilities are ensured for all genders and to the youth. In addition, the project team will ensure social inclusion by providing equal access to resources and training opportunities to women, men and the youth. Integrating gender perspectives and fostering social inclusivity in these areas will not only promote equality but will also enhance the overall effectiveness and sustainability of the programme.

In this regard, capacity development will encompass development of training courses and training staff on the following:

- Gender sensitive curriculum development: how to incorporate gender perspectives into new courses that address and promote gender equality in agriculture, sustainable mining and renewable energy programmes. This will include courses on gender sensitive climate adaptation and mitigation strategies, gender-responsive agricultural practices, developing gender sensitive renewable energy technologies, that minimize environmental impacts, and ensuring equal access to education and training.

- Mentorship and leadership programmes to promote female and youth leadership in programmes at the University. These programmes will target post-doctoral fellows and UNZA academic members of staff.

- Policy frameworks and institutional support: strengthen the existing UNZA policy frameworks to ensure they are robust and promote gender-sensitive policies, ensure equal representation and participation of all genders in programs and decision making processes.

- Gender, Artificial Intelligence (AI) and machine learning for climate change studies, sustainable mining, and renewable energy for rural transformation: Capacity development will focus on enhancing UNZA staff and post-doctoral fellows skills and knowledge on how to collect gender disaggregated data and integrate gender-disaggregated data in AI models to identify disparities and design equitable solutions to existing impacts of climate change on communities, and ensuring mitigation strategies and benefits accruing from them are distributed fairly across all genders. In addition, the course will address how to use AI and machine learning to model complex climate systems, improve and assess the impact of various climate change mitigation strategies on different gender groups; in sustainable mining the staff and postdoctoral fellows will learn how to identify efficient extraction techniques, and minimize environmental impacts.

7.3 Ethical Standards

The University of Zambia is a signatory to various international ethical standards that are informed by its own policies and various national regulatory frameworks. The teams working on the various sub themes will adhere to the highest level of ethical standards guided by

UNZA policies. If there is a gap in policy in certain areas during programme implementation, such a policy will be drafted and forwarded to the UNZA Council for approval.

8.0 INTERNAL AND EXTERNAL RISKS

Table 7: how do you rate risk in project proposal

Risk Description	Threat Description	Potential Impact	Risk Level	Proposed risk-mitigation measures
Internal				
Programme Deliverables	Deliverables delayed	Breach of Agreement and no this is incomplete	Low	All partners will be in constant communication, paying particular attention delivery dates
Finance/ Resource Mismanagement	Misallocation or misuse of funds/equipment	Delayed or non-achievement of objectives	Low	Adhering to institutional policies and constant monitoring of compliance
Procurement Delays	Difficulties in procurement, delivery time	Delayed or non-achievement of objectives	Low	Compliance with Annual Procurement Plans and close monitoring
Preventive maintenance and adequate facilities for laboratory Equipment	Lack of policies for preventive maintenance and adequate facilities for laboratory Equipment	Delayed or non-achievement of objectives	Low	Institutional managerial support. Policies and procedures on maintenance are in place. A thorough understanding of risk management
Labour Disputes		Delayed or non-achievement of objectives	Low	Constantly monitoring evolving conditions. Dialogue and lobbying decision makers.
Corruption	Bribes in overall programme	Financial losses, Delayed or non-achievement of objectives, Programme integrity	Low	Guarantee transparency and accountability. Develop and firmly follow budget procedures.
Communication	Ineffective communication between partners	Delays, conflicts and misalignment of objectives	Low	Clear communication channels and regular meetings, updates of progress
Grant/MOU Agreement	Breach of the Agreement by any party	Delayed or non-achievement of objectives	Low	Guarantee compliance and reconciling of divergences.
Changes in Programme Teams	Project leader, research team member illness,	Delayed or non-achievement of	Low	Utilise already existing UNZA mechanism of transfer of responsibilities in

	death, accident or resignation	objectives		the event of death. In addition, there will be multidisciplinary teams that assure that project knowledge is held by several people. Project management tool will document all work, outputs and processes to maintain institutional memory.
Institutional Bureaucracy	Delayed decisions	Slow progress	Low	Designate decision makers and constantly follow up
External Threats				
Increased inflation rates	Frequent changes in money exchange rates	Inability to procure number of planned for resources	High	Priorities programme activities to cope with increased inflation. Constantly paying attention to the volatility of prices and hoard material in anticipation of inflation. Include contingency budget lines and maintenance and control of contingency.
Political unrest	Civil unrest disrupting programme operations	Delayed or non-achievement of objectives	Low	Avoid involvement in politics UNZA employees are prohibited from seeking political office unless they resign from employment.
Change in Government	Change in government policies	Regulatory compliance challenges	Low	Experience has shown that every change in policy despite whatever party is in government has been consultative to ensure minimum disruption to existing programmes. This assumption is expected to continue. However, paying attention to any regulatory changes is essential.

9.0 PROCESS OF DEVELOPING THE CONCEPT NOTE

The Deputy Vice Chancellor, R & I in November 2024 appointed an ad-hoc committee to develop the concept note for the bilateral research cooperation between UNZA and Sida. He appointed a Chairperson of the ad-hoc team and further appointed team leaders of the various thematic areas representing schools of natural sciences, Engineering, Mines, Humanities and social sciences, Veterinary Medicine, Medicine and Agricultural Sciences. Units such as CICT and the Library were also incorporated. The team was tasked with developing the Concept Note in the following thematic areas of: Climate Change; Grants Office; IRIMS;

Mentorship, Supervision and Mandatory PhD Courses; Renewable Energy and Sustainable Mining. The team that was appointed, composed of both men and women, was multidisciplinary in nature and based on subject expertise from different schools across the university. This concept note was created through a participatory approach that engaged faculty members, ensuring alignment with national priorities and the University of Zambia's strategic vision. Stakeholders from various schools and departments were invited to prepare individual concept notes, which were subsequently collated and integrated into this comprehensive document. The Committee consulted various stakeholders and policy documents to inform the writing process. The Ministry of Technology and Science and Ministry of Education were also consulted.

10.0 REFERENCES

[1] U. o. Zambia, University of Zambia Strategic Plan 2023 - 2027, Lusaka: UNZA Press, 2022.

[2] G. Saifaddin, Gross domestic expenditure on R&D as a share of GDP in Zambia 2020-2022., London: Statista, 2023.

[3] AUDA-NEPAD, African Innovation Outlook III, Johannesburg: African Union Development Agency, 2019.

[4] Knoema, Zambia - Number of researchers in R&D, Knoema, 2025.

[5] World Bank, Zambia Country Economic Memorandum: Unlocking productivity and economic transformation for better jobs, Washington D. C: World Bank, 2024.

[6] M. o. F. a. N. Planning, 8th National Development Plan (8NDP) (2023–2026), Lusaka: Ministry of Finance and National Planning, 2022.

[7] G. o. t. R. o. Zambia, Vision 2030, Lusaka: Government of the Republic of Zambia, 2006.

[8] Ministry of Mines and Mineral Development, National Mineral Resources Development Policy, Lusaka: Ministry of Mines and Mineral Development, 2022.

[9] Ministry of Mines and Mineral Development, National Critical Minerals Strategy 2024-2028, Lusaka: Ministry of Mines and Mineral Development, 2024.

[10] Ministry of Energy, National Energy Policy (2019), Lusaka: Ministry of Energy, 2019.

[11] Ministry of National Development and Planning, 2016 National Policy on Climate Change, Lusaka: Ministry of National Development Planning, 2016.