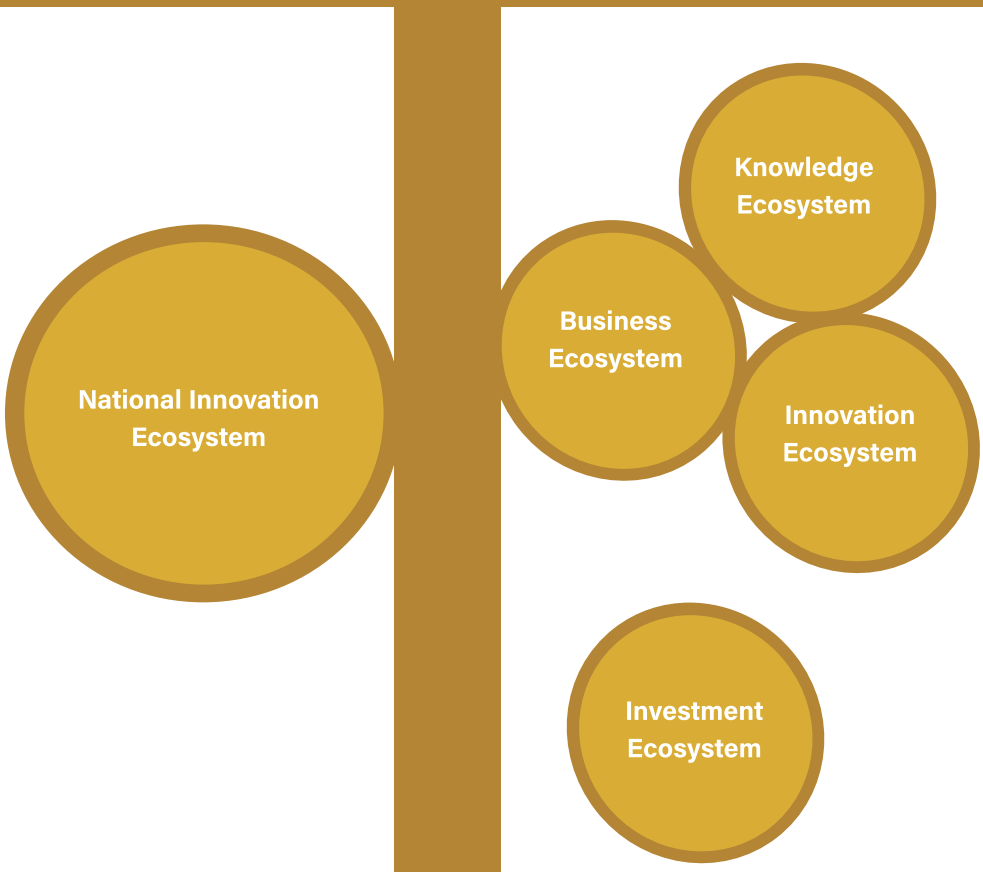
HANDBOOK FOR SUSTAINABLE INNOVATION

Learnings from Innovative Cluster and Innovation Fund Initiatives in Tanzania



Foreword

With great pleasure and enthusiasm, I introduce this “Handbook of Sustainable Innovation.” In an era marked by rapidly evolving technologies and an increasing awareness of the need for sustainability, this comprehensive guide stands as a testament to the remarkable progress made by COSTECH on Innovative Cluster and Innovation Fund initiatives.

Innovation is the driving force behind economic growth, social development, and environmental sustainability. It is the catalyst for change, the spark of creativity, and the encouragement for addressing complex challenges. Tanzania’s journey towards sustainable innovation is a story worth celebrating, and this handbook serves as a repository of invaluable insights, experiences, and best practices that have emerged from the nation’s dynamic cluster and fund initiatives.

Throughout these pages, you will discover a wealth of knowledge derived from the dedication, collaboration, and innovation of the individuals and organizations that have been at the forefront of Tanzania’s sustainable development journey. From nurturing innovative clusters that foster collaboration and creativity to the crucial support provided by innovation funds, this handbook provides a holistic view of Tanzania’s sustainable innovation landscape.

The lessons contained within these pages are not limited to geography; they transcend borders and resonate with anyone interested in harnessing the power of innovation for positive change. As we navigate the challenges of our rapidly changing world, the importance of fostering innovation and sustainability cannot be overstated. This handbook offers guidance, inspiration, and a roadmap for those seeking to create a better future through innovation.

I would like to extend my heartfelt appreciation to the authors, contributors, and stakeholders who have poured their expertise and passion into this

handbook. Your commitment to advancing sustainable innovation is an inspiration of hope, lighting the way for others to follow.

May this handbook inspire new ideas, spark innovative solutions, and encourage collaborative efforts that will shape a more sustainable and prosperous future for Tanzania and beyond. It is my sincere hope that the knowledge and experiences shared herein will empower individuals and organisations to embrace the transformative power of sustainable innovation.

As we embark on this journey of exploration and discovery, may we find inspiration in the experience and insights contained within these pages. Together, we can create a world where innovation and sustainability go hand in hand, where the power of human ingenuity is harnessed for the benefit of all.

Dr Amos Nungu,
Director General,
COSTECH

Abbreviation

BRELA	Business Registration and Licensing Authority
CARMATECH	The Centre of Agricultural Mechanization and Rural Technologies
CEO	Chief Executive Officer
COSTECH	Tanzania Commission of Science and Technology
CRIM	Cluster Research & Innovation Model
FDC	Folk Development College
IP	Intellectual Property
IPR	Intellectual Property Right
ISCP-EA	The Innovation Systems and Cluster Program in Eastern Africa
ISCP-Tz	Tthe Innovation Systems and Cluster Development Program in Tanzania
LGA	Local Government Authority
M&E	Monitoring and Evaluation Framework
MoU	Memorandum of Understanding
NFAST	National Fund for the Advancement of Science and Technology
NGO	Non-Governmental Organisation
R&D&I	Research & Development & Innovation
REDESO	Relief to Development Society
SDGs	Sustainable Development Goals
Sida	Swedish International Development Cooperation Agency
SICD	Sustainability Innovations in Cooperation for Development

SIDO	Small Industries Development Organization
SMEs	Small and Medium-sized Enterprises
STI	Science, Technology and Innovation
TanTrade	The Trade Development Authority
TBS	Tanzania Bureau of Standards
TCCIA	Tanzania Chamber of Commerce, Industry and Agriculture
TCI	The Competitive Institute
TIA	Technology and Innovation Assessment
TRA	Tanzania Revenue Authority
VETA	The Vocational Education and Training Authority
VINNOVA	Swedish Agency for Innovation Systems

Contents

1. Introduction

This handbook is based on two decades of practical experience in developing innovation-supporting activities in Tanzania, focusing on sustainable socio-economic development for micro and small firms and farms.

Innovation is no longer a phenomenon limited to firm competitiveness or the growth of nations and regions. Innovation is now also linked to sustainable development goals such as climate change, social sustainability and food security. Innovation and development towards a fair knowledge-based economy are vital for creating jobs, fighting poverty and instituting favourable conditions for sustainable development.

It is crucial to underscore the clear distinction between Invention and Innovation. Invention involves the initial creation of something entirely new, while innovation takes place when an invention is effectively introduced to the market or applied in a practical and valuable way.

Clusters, triple helix collaboration and innovation systems are established components to support innovation. To facilitate research and innovation there is a need to develop processes and infrastructure, where knowledge development at universities is linked to society and industry in collaboration. Clusters are one of the innovation platforms in the Tanzanian Innovation Ecosystems

1.1. The Origin of Specific Innovation Experiences in Tanzania

The Innovation Systems and Cluster Programme in Eastern Africa (ISCP-EA) was a university-led regional program, which started in 2004 and was implemented collaboratively in three Eastern African states, namely Tanzania, Uganda and Mozambique. It was coordinated and spearheaded in each of the three countries by respective Faculties of Engineering/ Technology of the Universities of Dar es Salaam, Makerere University and University of Eduardo Mondlane. The main objective was to stimulate, catalyse and promote the development of innovation systems and innovative clusters in Eastern Africa, thereby facilitating speedy socio-economic development and poverty reduction. The program enabled the universities to fulfil their mandate of reaching out and impacting societal development by stimulating, catalysing and promoting the generation of solutions to solve problems that confront their respective societies instead of remaining as 'ivory towers'.

The actual start was in September 2003 when ten Eastern Africans from Tanzania, Uganda and Mozambique attended the 6th Global Conference on "Innovative Clusters: A New Challenge", which was jointly organized by The Competitive Institute (TCI) and the Swedish Agency for Innovation Systems (VINNOVA), in Gothenburg, Sweden. The focus of the conference was on the development of methodologies and policies for building innovative clusters and innovation systems. The ten (10) Eastern Africans, who were sponsored by Sida (the Swedish International Development Cooperation Agency), represented the three main triple helix constituents of the national innovation systems in their respective countries led by the academia at the College of Engineering and Technology of the University of Dar es Salaam, Faculty of Technology of Makerere University, and Faculty of Engineering of the University of Eduardo Mondlane. The Gothenburg conference inspired the participants from Eastern Africa so much that they requested Sida to sponsor the organization of a replica of the conference for Eastern Africa. The request was granted by Sida and the conference gave birth to the Innovation Systems and Cluster Program in Eastern Africa (ISCP-EA).

Sida launched the Innovation Systems and Cluster Development Program in Tanzania (ISCP-Tz) in 2005 in partnership with the College

of Engineering and Technology at the University of Dar es Salaam. The ISCP-Tz was followed by a program on Fostering Innovation for Sustainable Socio-Economic Development from 2017 to 2023 at the Tanzania Commission of Science and Technology (COSTECH) with continued support by Sida. The programs aimed to support Tanzania's national socio-economic development by involving academia, research, and development organizations in fostering, accelerating, and supporting the growth of innovative systems and clusters.

Throughout the entire program development, collaboration has taken place with a Swedish partner, SICD (Sustainability Innovations in Cooperation for Development). The mission of SICD is to collaborate in fostering sustainable social and economic development. SICD has since the early 2000s close cooperation with universities and other actors in East Africa and Bolivia. The cooperation activities are focused on cluster and innovation system development, including research components, sponsored by Sida and in its start also by VINNOVA. SICD is presently hosted by Lund University and Södertörn University.

Following this introductory section, the handbook is structured into three primary parts encompassing Innovative Cluster Initiatives, Innovation Funding, Key Achievements, and Recommendations.

Part I : Innovative Cluster Initiative

2. Concepts and Functions

As mentioned in the introduction above it is crucial to be clear about the distinction between an invention and an innovation. An invention involves the initial creation of something entirely new, often as a result of research, while an innovation takes place when an invention is effectively introduced to the market or applied in a practical and valuable way.

2.1. What are Innovative Clusters?

A cluster consists of specialized firms or farms co-located within a geographical area with linkages to suppliers, supporting organizations and knowledge institutions. Firms in a cluster can benefit from common assets such as natural resources, good infrastructures, knowledge resources and access to a specialized and qualified workforce. Trust among cluster firms and other cluster actors creates social capital, which is an important cluster asset.

To initiate a cluster is not to initiate a project. A cluster has a start but not a defined end. A cluster may be initiated by the government, academia, or a private sector development agency. Innovation-driven actors from different sectors aim to support the renewal and competitiveness of the cluster firms. A decisive factor for the development of a cluster is facilitation supporting the decision-making and collective action among the involved actors - all the firms and organizations that are linked together in value creation. To initiate a cluster is the conscious attempt to mobilize and organize actors and resources to make individual cluster firms more innovative and competitive.

The deliberate action of embracing innovation, knowledge application and sharing transforms a cluster into an innovative one. Innovation becomes the key driver for achieving competitiveness of the cluster. A cluster that embraces innovation, is an innovative cluster. An important condition for an innovative cluster is the conscious attempt to organize key actors in a cluster by engaging government, academia and the private sector in what is commonly referred to as the Triple Helix configuration for collective action.

2.2. Cluster facilitator as the binding glue

The key for innovative clusters to succeed and be sustainable is devoted to persons both in operational and decision-making positions. The cluster facilitator is extremely important. For the linkage processes and activities with the university/knowledge institution, the cluster committee member coming from academia has a special responsibility and critical function to support the facilitator.

The facilitator must be able, supported by the academic member of the cluster coordinating committee, to

- Understand the knowledge needs of the cluster firms out of the voices from the firms.
- Have knowledge about resources at the universities/knowledge institutions and have the ability to reach out to these institutions
- Build reliable relations between relevant researchers and cluster firms
- Identify and acknowledge opportunities for cooperation activities encountering both the needs of the cluster firms and the interest of researchers
- Identify and document innovations within the cluster
- Identify (or lead the identification) and acknowledge possibilities for funding
- Opportunities for projects encountering both the needs of the cluster firms and the interest of researchers.

To find a person with the mentioned qualities, experience has shown that the candidate may be among the cluster members or may be an expert or researcher in the relevant area of speciality, as well as may be an employer from Local Government Authority. Another important issue to consider is having a good succession plan.

2.3. Cluster development by design

Collaboration, motivation, and social value creation are central themes in an innovation ecosystem and are of key importance for technological and economic development. These themes are also quite challenging and at times conflicting as people will have different interests, motivations, and goals for their actions in a project. Incorporating elements of design thinking in the innovation process can help minimize these tensions and help the facilitators guide the triple helix stakeholders to shared, beneficial outcomes.

Innovative clusters with the potential to renew themselves and innovate in ways that enhance social and environmental sustainability, competitiveness and growth cannot happen by chance. It is necessary to collaborate using the Triple Helix approach (see Chapter 3) and to develop a policy framework that will encourage shared goals and coordinated action. Another significant cluster asset in the form of social capital is trust between cluster firms and other cluster stakeholders.

Cluster development needs capacity-building programs to improve their ability to analyze products and process innovation as well as to define market opportunities. Cluster members and facilitators must be trained on how to manage their activities and attain competitive innovative cluster products and services.

Local Government Authorities (LGA) need to learn how to analyze the situation for local economic development and the possible contributions of the clusters to job creation, value addition to local products, specialization and skills development as well as the opportunities for diversification of agriculture, industry and services in their region.

Universities and R&D institutions as knowledge hubs and sources of technology development need to build capacity for cooperation with other Triple Helix partners for resource sharing and spillovers.

Using the “Learning by Doing” opportunity to enhance the capacity of the involved actors to promote, govern and manage the implementation of innovation-based interventions for sustainable socio-economic development programs. This includes training and analysis of the situation of the clusters in the local contexts, which will influence how to make and

implement plans for interventions and how to cooperate with the partners for good management and organization of activities.

Furthermore, clusters will be able to link up with other governmental authorities to advocate for the clusters.

Some of the capacity building will preferably include sensitization workshops, awareness training, cluster facilitators training, enumerator's training on baseline survey, workshops on cluster research and innovation model, workshops on M&E framework and partners workshops. Study visits to other countries will expose staff to new experiences and lessons on approaches to promoting linkages and collaborations for competitive products and innovations.

All training, sensitization workshops, field works and visits can contribute to the improved capacity building for project partners on thinking, planning, doing, re-thinking, managing and telling. This is realized via the documents produced, decisions made, cluster business plans developed, institutional structures formed (organizational form), designs or prototypes made, innovations developed and public relations conducted during the specific project implementation.

Capacity-building programs for LGAs can enhance more understanding of the cluster concept and gain ownership in their locality. In this way, the respective LGA will be able to engage in cooperation with relevant stakeholders to support clusters and their firms.

Table 2.1. Capacity-building interventions and outcomes

Interventions	Interventions
Sensitization of stakeholders	• Revealing of existing opportunities for support and commitments from both Regional and District councils. • Understating of Cluster Concept by top leaders at Regional and District levels. • Identification of key actors relevant to each cluster
Baseline Survey to establish the basic understanding of the cluster´s situation; its competitiveness and innovation capacity, as well as the role it plays in regional development.	• Workshops providing feedback on key findings to stakeholders and recommendations emanating from the baseline study to enable them to validate reporting.
Training of cluster facilitation	• Cluster members and affiliated Triple Helix organizations gain facilitation capacity.
Partners planning and feedback meetings and workshops	• Lessons and learning from individual cluster firms. • More effective reporting formats developed.

Training to district councillors from respective districts	• Workshops conducted, one for each respective cluster impacting skills to the LGA staff and councillors on innovative cluster programs on how to incorporate cluster activities into their development plans.
Establishment of Cluster Development Committees to facilitate collaboration between clusters in the specific LGA and academia.	• Cluster Development Committees established for each cluster.
Support minor investments based on baseline study and TIA analysis	• How the tools can be used for needed investment support.
Operationalization of the cluster guidelines	• The five (5) guidelines tested and checked for their relevance and effectiveness, particularly in the management of knowledge generated through prototyping.

3. The concept of the triple helix as applied in innovative clusters

3.1. Principles

Triple Helix is the conscious attempt to organize key actors in a cluster by engaging government, academia and the private sector. The Triple Helix configuration for collective action in the development of clusters could be seen as an innovation in development dynamics. Note that sometimes the government may include both national (federal) and local (provincial/state) but most important is the local government. Likewise, the academia may be a national or local research or training or vocational or extension service institution.

3.2. Context and different motivations

The three main actors do, however, exist and function in various innovation ecosystems in Tanzania, including the entrepreneurial ecosystem, where its people and the culture of trust and collaboration allow them to interact successfully. The knowledge ecosystem focuses on producing new knowledge and technologies, and the business ecosystem on creating customer value. The people and roles in these ecosystems vary, but so do connectedness, logical acts, results, and even language.

In addition, different types of technologies and solutions are developed and transferred through different transfer methods. Technologies fall under the category of physical products and mixed goods (public and private) such as hardware or software. As a result, it appears that the actors and their alignment in innovation are not consistent, necessitating the use of innovation intermediates to address market and systemic flaws.

Hence, there should be mechanisms for determining the transfer and utilization of knowledge and technologies within and between ecosystems. To achieve that innovative clusters come with a set of guidelines and preconditions to ensure the expected dynamic interactions between three actors in fostering entrepreneurship, and innovation are adequately attained.

4. Guidelines for Innovative Cluster Development

4.1. Introduction

This handbook addresses five guidelines that have undergone rigorous refinement and empirical pilot testing to assess their suitability and effectiveness in the practical implementation of the Triple Helix approach.

i. Cluster Research Model (CRIM): This guideline provides a way of systematically thinking about establishing collaborations between academic / knowledge institutions, entrepreneurs and government authorities in the so-called Triple Helix configuration. It consists of preconditions for effective collaboration, guideline for the different actors and possible strategic choice models. The complete, detailed guideline document is given at the following link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

ii. Technology and Innovation Assessment (TIA): The production chain can be used as a framework for the technology and innovation assessment in the context of clusters. Important steps in the guideline include: Mapping the different elements and links of a production chain; Formulating a product objective; Assessing the market opportunities for the product objective, modifying it accordingly and setting out the boundary conditions for the technological upgrade. The complete, detailed guideline document is given at the following link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

iii. Intellectual Property (IP) issues between and within cluster stakeholders: The guidelines enhance and facilitate the engagement of clusters in design or prototyping. The clusters are guided on how to secure the needed IPR issues like patent, trademark, pattern protection or copyright. The complete, detailed guideline document is given at the following link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

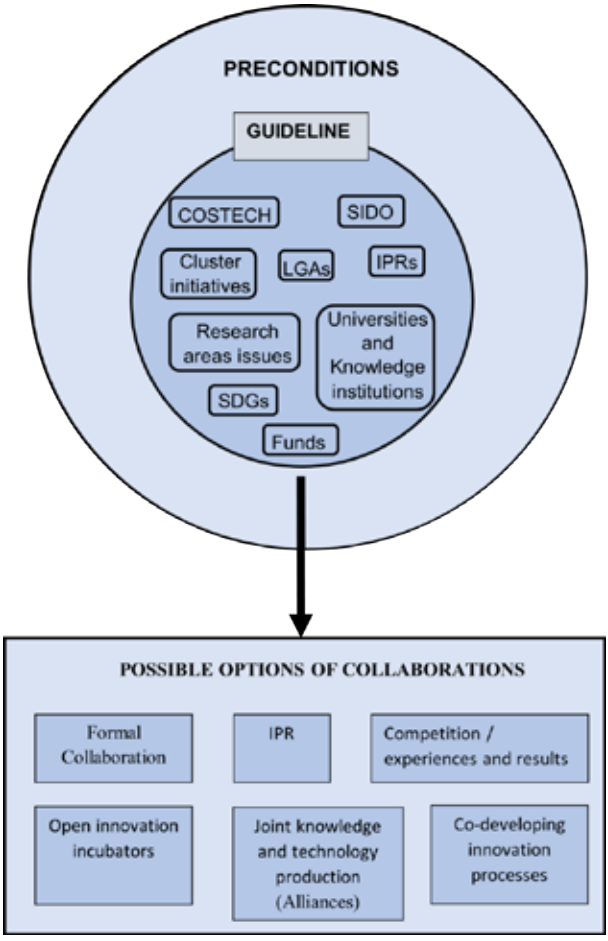
iv. Guidelines for exports of cluster products: This guideline is used to enhance the clusters' capacity to analyse market opportunities

for their products and services internally as well as externally and on both a practical and an abstract level. The complete, detailed guideline document is given at the following link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

v. Monitoring and Evaluation Framework (M&E): This is a method to monitor all interventions in the clusters and evaluate the results. The framework for M&E is an instrument for testing hypotheses regarding cluster development. Regular use of this instrument will create opportunities for learning by doing and a continuous adjustment of the intervention plans. The complete, detailed guideline document is given at the following link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

4.2. Cluster Research & Innovation Model (CRIM)

The framework depicted in the figure below provides a way of systematically thinking about establishing collaborations between academic / knowledge institutions, entrepreneurs and government authorities in the so-called Triple Helix configuration, which will be applied throughout this guide. It consists of ten (10) elements inside the two cycles with the CRIM guideline as the centrepiece and with six (6) strategic choices models (the boxes outside the cycles).



The elements of CRIM

Stretegic choice of CRIM

Figure 4.1 The CRIM Framework

4.2.1. Preconditions

The table below defines each of the elements represented inside the two cycles and provides examples.

Table 4.1. The elements of the preconditions.

The elements	Preconditions
COSTECH, SIDO, cluster firms	Training of involved partners: COSTECH, SIDO, cluster firms, involved staff at research institutions, involved government staff, facilitators and any closely involved partners when appropriate.
Cluster firm:	At the cluster firm level: • A common agenda created among the cluster firms based on situational analysis, identification of needs, problems and challenges • Trust built among cluster firms with joint low-hanging fruit activities • Leadership groups for every activity created depending on needs • Visits among the different cluster firms • Apprenticeship of workers among cluster firms is encouraged
University/ knowledge institution:	• A database of research and researchers or research resource lists, if existing • Having an access point via COSTECH to the database or research resource lists • A focal point at the university/knowledge institution i.e. interested university facilitator • Institutional IPR policies and regulations that promote commercialization of research results.

Cluster facilitator	Devoted persons in both operational and decision-making positions: • The cluster facilitator is extremely important. It is as important for the facilitator to have support from the Cluster Coordinating Committee (Board) members. • The cluster committee member coming from academia has a special responsibility and critical function to support the facilitator • The cluster committee members coming from stakeholders other than the university need to be from a decision-making position

4.2.2. Guidelines for the actors

The table below presents guidelines specific to each actor within the innovative cluster context.

Table 4.2. The elements of guidelines

The elements	Guidelines and Examples
At Clusters:	• Develop contacts and relations with relevant units at universities/knowledge institutions; a task for the facilitator. • Make visits to relevant units at universities/ knowledge institutions. • Depending on the situation, develop a plan/road map for the utilisation of relevant research results in the cluster. • Use the cluster boards / coordinating committees and the institutions, that are stakeholders in the cluster, to support and enhance linkages with academia.

At Universities and knowledge institutions:	• Involve master students in different cluster activities. • Perform workshops and seminars on innovation and cluster development at the faculty level and later on cross-university level. • Build trust among researchers and cluster firms through joint visits. • Depending on the situation at the university/ knowledge institution link up with an interested university focal person. • Develop an Innovation Team of interested researchers linked to the cluster program. • Inform and develop agreements on the top leadership level about innovation strategies, where cooperation between researchers and cluster firms is one of the strategies requested. • Customize (language) existing results for easy use by clusters. • Establish a framework for sharing university facilities with SMEs outside universities. Make sure the facilities are insured and accredited. • Take the role as a collaborative platform for R&D&I projects, which researchers and students jointly conduct. This is possible for universities with innovation hubs/spaces.
At COSTECH	• Make sure the database of research groups and research projects from the involved universities and knowledge institutions are updated as much as possible and available for support to the clusters. • Provide details regarding research-related problems identified by the clusters available for master (or other degrees) students. • Develop a knowledge common at the cluster website.

At SIDO	• Take the role as a collaborative platform at the local level for R&D&I projects, which researchers/ students jointly conduct.
At Government	• Contact, inform and discuss the involvement of the local government (and central government where appropriate), to which the cluster firms belong. • Perform workshops and seminars on innovation and cluster development with a special focus on the role of government and how to link research resources • Develop relevant agreements with LGAs • Based on tangible and research-related results from the cluster program develop joint funding strategies.

4.2.3. Specific guidelines

The table below presents guidelines for the specific functions.

Table 4.3. The elements of specific guidelines

The elements	Examples
Intellectual Property (IP)	• The promotion of joint research results should be through a joint brand. • For agriculture-related clusters, the branding is closely linked with official certification. Access to analysis lab facilities at universities for certification is one of several ways for cluster firms to cooperate with universities.
Funding issues	• Funding opportunities for projects should meet both the needs of the cluster firms and the interests of researchers.
Research area issues	• The identified needs, problems, and challenges within the cluster will help to identify the needs for research-related cooperation.

SDGs	• SDGs with a special focus on gender dimension fostering quality in cluster's innovation development as well as the inclusion of women in clusters; decent work agendas and environmental responsibility.

4.2.4. Strategic choices

The table below offers examples of issues to be considered regarding each of the strategic choices in the CRIM.

Table 4.4. Strategic choices

Strategic choices	Example of issues to be considered
Formal collaborations	• Clusters establish a formal collaboration with a specific department of a university/R&D institution to work closely with the cluster through capacity building in an identified need at any node of the innovation value chain e.g. product or production process development, marketing, innovation skills development.
Joint knowledge and technology production (Alliances)	Joint knowledge and technology production (Alliances) • The establishment of an alliance between the university and cluster firms of the specific product/ sector. • The alliance begin with the formation of a team responsible for carrying out the activity, consisting of representatives from the university/ R&D institution and cluster firms. • The team may also bring in a graduated student. • The involved actors will start to understand the dynamics of each actor in the project and mobilize the available resources.

Co-developing innovation processes	• Problem identification for inclusive innovation processes. • Joint agenda setting. • Science-based and experience-based knowledge production and prototyping. • Common obligation.
IPR, knowledge commons, new models for ownership	• Intellectual Property issues are high up on the agenda for open and inclusive innovation. • The innovation activities in the cluster context should start considering IP at the beginning of the innovative process. • The more concrete results of the IP discussions might include a MoU followed by, a 'consortium' agreement, joint ownership, and assignment of IP. • See the specific IP guideline in 4.4.
Open innovation incubators	• An open innovation business incubator is a physical or virtual environment that combines the attributes of open innovation and business incubation concepts in creating and supporting new start-ups. • Knowledge, competencies and ideas can be introduced from outside the organisation into the innovation process. • Management and operation practices as well as sharing resources and facilities in value-creation collaboration projects are critical.

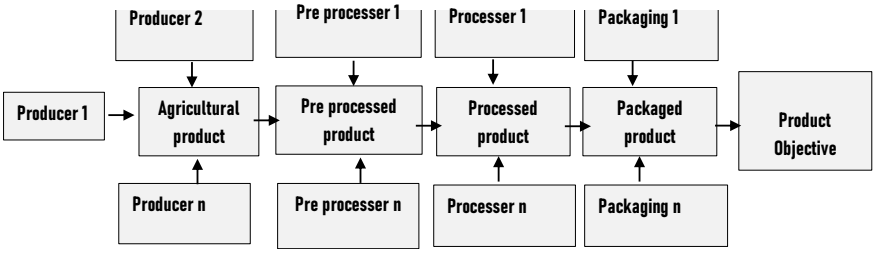
Open innovation incubators.	• Competition is defined in the cluster's terms as a relationship within or across clusters where members compete while collaborating. • Such scenarios include making similar but specialised products within a cluster. For example, one cluster firm can make a product similar to another firm but prepare a very attractive package. • Each firm can compete to make either a more specialized product or packaging while enhancing skills and product development, thus, demanding input from sources of knowledge.

Please note that all details of the guideline document are available at link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

4.3 Technology and Innovation Assessment (TIA)

In the context of clusters dealing mainly with agro-processing, where several types of producers and processors are organised in a value chain, the production chain or production network is used as a framework for the technology and innovation assessment. This framework provides a way of systematically coordinating innovation processes for product objectives in the cluster. It consists of five chronologically arranged steps The corresponding guidelines and examples, when properly followed, will reduce or eliminate risks, if innovations in one part of the value chain seem to be detrimental to the performance of other cluster activities.

Fig 4.2. Framework of the production chain with various links in the chain from inputs to outputs



In the table below steps for the Technology and Innovation Assessment guideline are presented.

Table 4.5. TIA steps.

Steps	Guidelines and examples
1. Map the different elements and links of a production chain (Fig 4.2)	• Identify the producers/processors involved in the activities and their location in the value chain. • Organize the production chain including input and output. • Divide Individual responsibilities along the production chain. • Positioning of the actors and partners in different production steps.

2. Formulate a product objective (Fig 4.2.)	• Define the product objective. The product objective is what the product improvements, the technological upgrading or innovation should contribute to.
	• Prioritize the objectives of the cluster considering if
	  • a specific change is desirable,
	  • whether it is technically or scientifically possible,
	  • if it is achievable in terms of finance, politics or other terms that may influence the implementation.
	• Select/identify possible technologies, key partners and the re-organization of the production chain to meet the objective.
	• Assess the practicability of the new business model influenced by the changes.

3. Assess the market opportunities for the product objective	• The product objective contains assumptions on the value added to the product and possible increase in revenues. It should be based on, at least a rudimentary, market survey and adapted to the result gained. • The end product should be certified and affordable.
4. Set out the boundary conditions for the technological upgrade	• Based on the defined product objective consider boundary conditions in the selection of the technology or the direction of search for an innovation process. • The boundary conditions should regard costs, resources, expertise requirements and quality improvement. • Assess accessibility and availability of any support related to changed production processes such as associated technologies and compliance with regulatory requirements. • Consider connections to universities, R&D institutions or industries and companies for knowledge and/or facilities.

5.The Sustainable Development Goals must be considered.	The clusters are supposed to contribute to socio-economic development. Hence there is a need to also assess how a new technology or innovation contributes to or links with other goals such as the following.
	• **A socio-economic goal** that refers to the contribution to technologies that
	  • increase income
	  • increase job opportunities for women and youth
	  • ensuring economic security of the activities related to engagement in the cluster.
	• **A decent work goal** that covers:
	  • how the job opportunities created relate to safety in the workplace
	  • occupational health
	  • fair conditions.
	• **An equality goal** that particularly looks at the effect of changes on
	  • gender (women, men),
	  • age (young and old)
	  • disabilities (degree of inclusion and non-exclusion).
	• **A skills goal** that considers how change contributes to
	  • upgrading skills
	  • deskilling of the labour

	• An **An environmental goal** considering how changes may affect the opportunities for sustainable production patterns minimizing environmental hazards and optimizing natural resource management.

Please note that all details of the guideline document are available at link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

4.4. Intellectual Property Issues between and within Cluster Stakeholders

This guideline offers fundamental knowledge and options for Intellectual Property (IP) issues, which are cost-effective solutions to structural and non-formal knowledge asset management.
The guideline is meant to be used by cluster firms, cluster facilitators and innovators and with IP as a tool for sustainable economic growth in the Tanzanian context.

The guideline is based on an understanding of technological advancements enhancing the ongoing globalization progression to the extent that even SMEs have excess to market opportunities inside and outside countries. But competitive abilities remain to be the main precondition for success. In a competitive environment particularly in Tanzania, not only structural Intellectual Property but also expertise and relations are becoming increasingly important to ensure success. This has been demonstrated through COSTECH's experiences in supporting innovative clusters and innovation projects in Tanzania. However, there is no doubt technologies and innovations "co-evolve" out of interactions in specific contexts. This implies the responsibility for where and how these technologies and innovations travel, with what value and use and to be a collective one - "innovation looks less and less like a pipeline if indeed it ever resembled one."

The cluster context is characterized by fostering collaboration between research institutions, cluster firms and government authorities in a so-called Triple Helix configuration. In an East African country like Tanzania, local businesses can often not be expected to contribute substantially with funds for knowledge collaboration, but their contribution with knowledge for survival and adjustment to basic circumstances is a necessity. In this context, researchers and local business people will together find essential knowledge faster than counterparts in more isolated locations.
The actual learning processes born from context-specific knowledge are vital results that people and cluster firms can rely on and build their futures upon. If a resource, vital for the cluster firms, is found to be profitable, chances are that more powerful external actors see opportunities to exploit, buy land or property, introduce more high-tech methods or go into

business in ways that do not benefit the local economy and the cluster members. Situations are also such that, when the cluster firms become more profitable, the risk increases for external interests to manipulate the cluster members and take over. This can be observed both in Uganda and Tanzania. Thus, providing efficient solutions to meet the IP, or rather knowledge asset needs throughout the innovation life cycles, is crucial.

4.4.1. A Contextual Overview of Innovation and Ownership

Innovation

Innovation is a short word but has the habit of confusing most of its audiences worldwide, when used as an opening statement. From there, all is lost in translation between different stakeholders and individuals. The path of trust and collaboration is often too cumbersome from the beginning. Therefore, a starting point is to schedule time and effort to work on the collective understanding of innovation in practice what it means in a specific programme or project and how the management of innovation can be designed. The first concrete step is to investigate the history of the word innovation as well as the interconnection between innovation and entrepreneurship. A second step is to work with different cases and/or examples from the specific geographical and cultural contexts of relevance. Thirdly, when innovation is used in practical collaborative processes, establish first and foremost a culture and habit of trust. Trust is the gold, the foundation of collaborative work. Whilst nine out of ten attempts at innovation fail, the spill-over effects of collaboration will increase the probability of success further down the road.

Ownership

From a historical point of view, the development of the legal concept of ownership or property differs across time and cultures. Ownership is the basis for many other concepts forming the foundations of ancient and modern societies. The hypothesis is that ownership or property has driven and drives innovations and entrepreneurship. Moreover, innovation and entrepreneurship drive economic growth and competitiveness. There is a bias and path dependency in research, policies and public interventions to promote innovativeness and entrepreneurship that narrowly has focused

on monetary remunerations as the main driving forces of human and societal development. As times are changing, there has been a small but steadily growing river, with contributions from different research fields, practices and policies that formulate optional and maybe more adequate avenues for societal beneficiary innovations and new entrepreneurs that want to impact and succeed by both “doing good” and “earn money”. One of many examples is the increased focus on the Sustainable Development Goals of the UN. This has implications for innovation processes and the effectiveness and usefulness of IP.

4.4.2. Approaches to IPR in innovation processes

Basic question test

The traditional stance on IPRs is historically biased. Although these rights still serve the important purpose of protecting the owner(s) of the intellectual work and reaping the fruits, there are many questions to be examined before choosing the road towards lawfully protected IP. IP in itself does not mean that an innovation has occurred, it merely indicates an ownership of a future innovation and possible remunerations.

When designing or planning for a technological solution, the following practical questions need to be considered.

Table 4.6. Practical questions.

S/N	Question/Challenge	Your response
1	In what sector does the new idea and/or solution occur?	
2	Is the idea and/or solution the fruits of collaborative work between different stakeholders?	
3	Is there a potential market and/or customer for the solution/product (prototype/validation)?	
4	Are there producers, suppliers or other associated partners willing to be part of the value chain?	
5	What does the business model look like?	

The above questions can serve as a baseline to investigate the probability of success and value of the new idea/and or solution. They also indicate if there is a need to use IP or not. Innovation management does not per se involve IP management.

4.4.3. Collaborative Innovation Processes

There is extensive research on many different aspects of collaborative innovation processes. Collaboration can occur in contractual settings, in open and non-regulated processes with shared goals and often shared values as well as in a mixture of regulated and non-regulated collaborations. All innovation processes are flawed with uncertainties and the road towards a successful and scalable innovation is highly risky. Therefore, one way of lowering the risk of failure is to share the risk with others in pursuit of new solutions and innovations. Another aspect is that complex solutions require different competencies and stakeholders. Inevitably the case for IP early in an innovation process must be explorative by nature and regulated by MoUs rather than contracts and/or IP, and above all rely on trust.

As the innovation process progresses, there will be a need for checks and balances as well as negotiations. The rules of collaboration precede any discussions on contracts and/or IP.

Table 4.7. Topics or questions to be a starting ground for the rules of collaboration

S/N	Question/Challenge	Your response
1	What goals and dreams of solutions/ innovations do we bring to the table individually?	
2	What are the drivers of our collective work and what are the hindrances that we can see?	
3	What contributions are positive to the solution and how do we reward the source?	
4	Are we missing stakeholders/individuals at the table? (regulatory, associated technology….)?	

5	Can we formulate rule books and checks and balances together and follow them? (Here IP may come up. But go back to the basic questions test above and formulate an MoU.)	

4.4.4. Stakeholders' Views on IP

Companies

It is useful to understand in depth the different stakeholders and often on an individual level - where they stand on ownership and how protective they are of their knowledge, networks and commercial aspirations. It is about the public or private organization's culture, capacity and experiences. Larger companies tend to favour a strict contractual view on IP. Their assets or the IP portfolio are used as a shield or a bargaining chip in the competition with other companies in the same industry sector.

Historically, the value of the IP portfolio used to be mirrored in the company's value on the stock exchange markets. Experience shows that collaborations between companies and academia are not regulated by contracts that cover IP and non-disclosure agreements. Further, the universal experience of research on innovation ecosystems has shown that a density - geographically or digitally on platforms - promoting higher interactions contains a large number of uncodified knowledges exchanging and interchanging in collaborative networks. This density of uncodified knowledge and collaborations are highly competitive environments and non-contractual as they trust to build on. SME companies have a different method compared to larger companies and tend to go for the market opportunities often in collaboration with the bigger companies, not focusing on IP. Start-ups might stem from IPR, but usually end up with a quite different business idea altogether.

Thus, when it comes to IP (patent/design protection) for smaller companies and start-ups, it seems the value lies more in creating a network (MoU) where the product or function rests on a common mix of knowledge and skills. Consequently, it must be difficult to copy. However, it is important to clarify the network's mutual relationship at an early stage through e.g. consortium agreements or similar. A possible protection of the product/

function can be judged to be interesting in a situation, where it is possible to confirm that the product/function meets a stated or unspoken need and thus an opportunity to build a lasting business exists. Protection of its product/function by e.g. patents at an early stage of a product/function's life cycle is no guarantee that the business will succeed in growth and profitability. Rather a patent can be directly counterproductive for the development of the business by spending time on a potential threat that may not exist instead of building business relationships and growth opportunities.

If you as an external partner are to support companies/start-ups in the journey to create a market position, it is advisable to focus on creating an understanding of the value of a well-developed business plan with clear strategic choices and goals. Furthermore, it must be ensured that the innovators/entrepreneurs are helped to surround themselves with the right advisors. The issue of patent/design protection only becomes relevant when a certain market position has been achieved. Even then, the need must be carefully weighed based on different risk scenarios.

Academia and Research Institutions
Higher Learning and Research institutions tend to either ignore (almost by self-punishment) the knowledge possessed and desired by other stakeholders, as the main goal is to publish scientific articles and teach students. On the other hand, researchers can be very fierce advocates of IP (almost possessed by the discovery) and normally ignore the basic questions test mentioned above as well as the possibility for collaborations as a means to reduce risks and to reach markets/customers more efficiently. Very few universities in the world have the luxury of being able to license their patents and afford to pay for them and protect the IP portfolio.

Public actors
Policymakers decide on the frameworks and budgets for specialized ministries, and agencies at different local, regional, national and international levels. An example of this is the legislation of IP and their regulatory agencies. STI policies and agencies cross-ministerial borders. If IP legislation, standardization regulations, and health regulations amongst many other statutory rules are going to promote innovation and entrepreneurship, there is a need to establish an inter-ministerial and inter-agency-based view as well as strategy and plan for open innovation

and challenged-based innovation as a base for new entrepreneurs. This means, fostering the development in the context of IP and standardization, responsible agencies need to build alliances with COSTECH to design a customer-based service and support for clusters, start-ups and Innovation Labs.

Civil societies
When engaging civil society in innovation processes there has to be a fair balance between what individuals and/or NGOs contribute and what other stakeholders are to gain. A fundamental ethical code of conduct needs to be in place as well as remunerations in different forms.

Stakeholders' interview questions, which need to be context/project specific as a dialogue tool to create trust for innovation processes..

1. What role/roles does the stakeholder have?
2. What goals, objectives and interests/drivers does the stakeholder have?
3. How will/does the activities impact the stakeholder?
4. How will the stakeholder impact the activity?
5. What activities in the innovation process are there for the stakeholders?
6. What are the benefits for the stakeholder (short, medium, long term)?

Please note that all details of the guideline document are available at link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

4.5 Guideline on Export for Cluster Firms

As part of the export promotion efforts, the government created the Trade Development Authority (TanTrade) in 2009. The organization has been instrumental in developing the initial set of the guideline adopted in this document. COSTECH engaged experts from TanTrade and academia to revise and customize the guideline, which is intended to improve the capacity of cluster members to engage in the export business. This guideline will expose entrepreneurs in clusters to the key concepts applied in the export business. It will equip them with the requisite skills to prepare their business and products for exporting and make them aware of the key steps and responsible supporting organizations.

4.5.1. Preparing for the export market

Exportation can be easily defined as the sale of goods and services across country borders. If you sell your goods or services beyond your country's border, you are exporting. Export is a very wide concept which involves lots of preparations and documentation before you can export. Before you start exporting products make sure you are ready to do that, because there are a lot of risks involved in exportation. It is important that you seek advice from a reputable trade promotion organization such as TanTrade regarding the relevant information on markets, updated international prices for your product category, the database of prospective buyers if it exists, market requirements, competition, tariffs and potential non-tariff barriers that you are likely to face while exporting. TanTrade will be able to advise you on the various opportunities available in international markets and where necessary guide you through other relevant sources of further information.

After you are sure that you are ready to export you have to prepare yourself for such a task. Below are some of the hints for what you need to have or comply with in preparing your product for international markets, The details for each sub-topic are accessible through this link of innovative Cluster initiatives at COSTECH ***(clusters.costech.or.tz)*** to the detailed guideline document.

a. Product name
b. Branding
c. Labelling
d. Weights and measurements
e. Pictures of your product on the label
f. Country of origin

Factors to consider before exporting

Exports are good for any enterprise however exportation is not as easy as it seems, SMEs face fierce competition and hurdles while trying to export. Foreign markets are ruled by stringent export procedures, standards, ethics, rules, consumer preferences and sometimes tariff escalations in some products and a lot of non-tariff barriers. That is why it is important to consider the following before any enterprise decides to opt for exports.

The following checklist will assist with formulating clear objectives and assessing the firm's readiness to export.

1. What are the company's reasons for pursuing export markets? Are they solid objectives?
2. How committed is top management to an export effort?
3. Is exporting viewed as a quick fix for a slump in domestic sales? Will the company neglect its export customers, if domestic sales pick up?
4. What are management's expectations for the export effort?
5. How quickly does management expect export operations to become self-sustaining?
6. What level of return on investment is expected from the export program?
7. Who are the main domestic and foreign competitors?
8. What general and specific lessons have been learnt from past export attempts or experiences?
9. What in-house international expertise does the business have (international sales experience, language capabilities, etc.)?
10. 10. What organisational structure is required to ensure that export sales are adequately serviced?
11. What amount of capital will be required and can be committed to export production and marketing?

4.5.2. Benefits and risks of exporting

There are several benefits and risks that should be considered when a business decides to export. Any business venture involves certain risks and exporting is no exception.

Benefits of Exports
Exports have the following benefits.

- Increased sales and profits because exports increase sales. Profits are generated because usually, the export price is usually higher than local prices.

- Generation of foreign currency, which is good for the economic development of the country and the enterprise. Foreign currency is used for reinvestment and purchasing technology

- Exports also enhance the domestic competitiveness of the enterprise because of the investment that the enterprise puts into developing the product to meet international standards. Thus competitiveness in the local market is created automatically.

- Diversification of markets is good for enterprise sustainability.

Risks of Exporting

Exports have the following benefits.

1. Short demand for the product. Sometimes the product may be of seasonal demand only.

2. Additional financing (product development, certification, packaging)

3. Non-payment for products received by importers

4. Expense of developing new promotional materials, usually in the national language and cultural preference of the export market.

5. Foreign exchange fluctuations.

6. Transit bottlenecks

7. Expense for product modification to suit the buyer's demands

8. Litigation if the product does not meet the expectation of the buyer, does not arrive on time, fails to deliver, does not meet the agreed standards etc.

4.5.3. Preparations for export

After the enterprise has secured an international buyer, the company will then negotiate export sales contract terms. After signing the sales contract, the company is now ready to export and shall follow the following procedures.

General Business Requirements

a. The company must be fully registered by the Business Registration and Licensing Authority (BRELA) as per the requirements of the Law of URT

b. The Company must have a valid Business License class A obtained from BRELA and other business licenses obtained from Local Government Authorities

c. The Company must have a physical address, working email and phone number

d. The company must have a Taxpayer Identification Number (TIN) obtained from the Tanzania Revenue Authority (TRA)

e. For large Taxpayers the company must have a VAT Registered number (VRN) obtained from the TRA

The buyer might demand additional information such as the company's bankers, auditors, audited accounts, and tax clearance for a certain period especially when dealing with a huge sales contract. The seller has to make sure that access to information on his/her company is readily available when needed by the buyer.

f. Get an introduction letter from the Small Industrial Development Organization SIDO

g. Get health certification and quality certification from TBS and Zanzibar Bureau of Standard (ZBS)

h. Get certification from Tanzania Atomic Energy Commission

i. Register all medical products and devices with Tanzania Medicine and medical Devices Authority (TMDA)

j. Get a barcode from GS1 Tanzania

k. Get a certificate of origin from TCCIA

- Generalized System Preferences (GSP) and the EUR1
- SADC certificate of origin
- The African Growth and Opportunity Act (AGOA)
- TCCIA Certificate of origin
- Get inspection certificates

l. Get an insurance certificate

m. Get sanitary certificates

Many countries require health or sanitary certificates when animals, animal products, plants, plant products etc., are shipped into their countries. These certificates confirm that goods are free from disease or insect pests and that food products have been prepared in such a way that they meet prescribed sanitary standards. These certificates are issued by respective sector authorities such as follows.

a. Animal and animal products – Ministry of Livestock and Fisheries

b. Plant and Plant products – Ministry of Agriculture

n. Get a sanitary/phytosanitary inspection certificate

4.5.4. Export licenses/permits

Export licenses and permits are not international documents but are part of the process towards an international transaction. These are issued by the government authorities or agencies granting the right to export specified commodities. Export license fees for consignment exports were abolished in 1993. However, to attain certain policy objectives, increase the availability of resources to the domestic processing industry or control for environmental or ecological reasons, some export products are closely regulated by the government. To that effect, before a consignment is exported a special permit is required. Products that require such permits include

a. Wildlife and wildlife products - CITES

b. Timber and Timber Products

c. Fishery Products

d. Livestock and Livestock Products

An exporter of these kinds of products should follow the following procedure.

- Write a letter to the Permanent Secretary of the Ministry of Livestock Development and Fisheries indicating the kind of livestock and or livestock products the customer wants to export.
- Obtain a business license class A from BRELA
- Obtain an import permit from the importing country
- Quarantine livestock for not less than fourteen (14) days for vaccination purposes to ensure that they are free from pests and diseases.
- Get a report letter from the registered veterinary doctor who vaccinated the animals
- Get an export permit issued by the Ministry of Livestock Development and Fisheries – Department of Livestock Development for the customer who has fulfilled all the procedures.

e. Precious Minerals

f. Staple food products

g. Raw Cashew

Remember: An exporter might need to certify the products to international certification such as GAP and others as per the demands of the buyer. The buyer will notify the seller of the issuing authority for such certifications. Mostly the seller will pay for the cost of certifying the product unless otherwise agreed by both parties.

4.5.5. Export documentation

The law in Tanzania requires an exporter to use official clearing and forwarding agents to handle all necessary clearing and forwarding customs procedures. The list of all accredited clearing and forwarding agents is provided by TRA. You access the list through TRA's website. The C&F agents will handle all necessary paperwork on behalf of the customer. Nevertheless, the customer needs to know the common export documentation.

Common export documentations
The following are commonly used basic documents, The details for each document are accessible through this link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).* to the full guideline document.

a. Commercial Invoice

b. Pro Forma Invoice

c. Authorization letter

d. Export Packing List

e. Transport Documents

Once an export deal is agreed upon, the seller has to ensure that the goods contracted are shipped to the buyer. There are several ways in which goods could be delivered to the buyer. It could be by air, road, rail or sea. Documents that may be used in each of the above modes of transport are highlighted below:

- Air waybill
- Road/Railway consignment note
- Bill of Lading (B/L)

4.5.6. Incoterms

Incoterms are a set of rules established by the International Chamber of Commerce (ICC) to establish who's responsible for shipping, insurance and tariffs in a contract between a buyer and a seller. Incoterms are widely used terms of sale and are a set of 11 internationally recognized rules which define the responsibilities of sellers and buyers. Incoterms specify who is responsible for paying for and managing the shipment, insurance, documentation, customs clearance, and other logistical activities. The terms specify when the risk of goods is transferred from the seller to the buyer. In other words, the Incoterms rules form a crucial part of the buying agreement with a seller by dictating who will pay for loading and unloading costs, customs export procedures, insurance, import costs and more.

Understanding the Incoterms in the sales contract will assist you in having a grasp on the final cost of the product you're exporting. However, without this understanding, you may end up footing the bill that turns out to be higher than what you bargained for. Hence it is important for the exporter to understand common incoterms and to be very familiar with them because they are part of the sales contract.

Although the full 2010 Incoterms rules define eleven different scenarios, we'll cover the five most common terms as follows, The details for each sub-topic are accessible through this link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz)*. to the full guideline document.

a. EXW (Ex Works)

b. DDP (Delivered Duty Paid)

c. FOB (Free on Board)

d. CIF (Cost, Insurance and Freight)

e. FAS (Free Alongside Ship)

4.5.7. Trade payment methods

The ultimate goal for any business transaction is for the seller to receive payment and the buyer to receive goods or services according to the agreed terms. In today's world to become successful in the global marketplace, exporters should provide their customers with appealing sales terms supported by suitable payment methods. This requires knowledge of export payment methods used in international trade since the ultimate goal is getting paid in full and on time for each export sale. To achieve this an exporter has to choose an applicable payment method that reduces the payment risk while also fulfilling the needs of the buyer.

There are a variety of methods by which payments can be made. These methods include the following levels of risk for collection.

a. Cash-in-Advance

b. Letter of Credit (LC)

c. Documentary Collections

d. Open Account

e. Consignment

Each of the methods from most secure to least secure for exporters is discussed in detail and is accessible through this link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz)*. to the full guideline document.

4.6. Monitoring and Evaluation Framework (M&E)

A system for M&E is an important part of the cluster support model. Many of the aspects in such a model are generic but the model must also be specific and reflect the situation and challenges for the cluster and its enterprises. This is important for several reasons. Among others, the M&E model supports strategic learning and monitoring of the development and progress of the firms participating in the clusters and handling the specific challenges they are facing.

The M&E framework is based on the following survey questionnaire for monitoring the development of sustainable innovative cluster interventions:

- The purpose of the questionnaire is a (yearly) follow-up of the development of cluster firms since the baseline study has been conducted
- The questionnaire shall be based on the baseline study allowing for comparisons over time to be able to evaluate the development of the cluster intervention.Documentary Collections
- The questionnaire shall focus on some key indicators for the monitoring of the program.
- The questionnaire should be easy to answer, and not spend more than 10 minutes.
- The questionnaire will be distributed via mail and/or paper.
- The questionnaire targets the different actors for cluster collaboration (such as SMEs, universities, villages, banks, farmer extension officers, trade unions, cooperatives, and private sector/SME organisations) with a focus on SMEs:s and micro firms
- The format of the questionnaire should allow for qualitative and quantitative statistical analysis.

4.6.1. Questionnaire background information

Questions for companies and all actors:

1. Name of the person answering the questionnaire:
2. Gender: Female □ Male □
3. Position in firm/organization: Owner □ CEO □ Other:……
4. Name of firm/organization:
5. If company, Is your firm registered: Yes □ No □
6. If yes, Type of registration ……..…Year of registration …….

4.6.2. Questionnaire general information on the economic status

Questions for companies:

1. The total turnover of your enterprise from January-December 20….. (Turnover is defined as the market sales of goods and services, including all taxes except VAT)
   a. Increased more than 20% □
   b. Increased less than 20% □
   c. The same as in (three years before) □
   d. Decreased less than 20% □
   e. Decreased by more than 20% □

2. What was your enterprise's approximate total annual turnover for the past three years (Turnover is defined as the market sales of goods and services, including all taxes except VAT).

3. The total number of employees January-December 20….. has
   a. Increased □
   b. The same as in (three years before) □
   c. Decreased

4. Number of employees at the end of 20…… (31st December)
   a. Full-time female:
   b. Full-time male
   c. Part-time female:
   d. Part-time male:

e. Total employees in 20….. with an
   a. University degree …….
   b. Diploma ……..
   c. Certificate …….
   d. Std seven ……..
   e. Others (mention)…….

5. Has the company attracted external funding from banks, investors etc. during 20…..? Yes □ No □

Questions for other collaborating actors:

6. The total turnover of your organization for January-December 20…..
   a. Increased more than 20% □
   b. Increased less than 20% □
   c. The same as in (three years before) □
   d. Decreased less than 20% □
   e. Decreased by more than 20% □

7. What was your organization´s approximate total annual turnover for the past three years?

8. The total number of employees January-December 20…… has
   a. Increased □
   b. The same as in (three years before) □
   c. Decreased

9. Number of employees at the end of 20…… (31st December)
   a. Full-time female:
   b. Full-time male
   c. Part-time female:
   d. Part-time male:

10. Total employees in 20….. with a
   a. University degree …….
   b. Diploma ……..
   c. Certificate …….
   d. Std seven ……..
   e. Others ……..

11. Has the organization attracted external funding from banks, investors etc. during 20……? Yes □ No □

12. The total number of members January-December 20….. has
    a. Increased □
    b. The same as in (three years before) □
    c. Decreased

13. The total number of members on 31st December 2020 was….

4.6.3. Questionnaire cluster activities and innovation support

Questions for companies and all actors:
1. How do you value the services presented by COSTECH:
Very important Important Not so important Not important Not applicable

a. The general support from COSTEC
b. Any other support, please mention…….....
What kind of support from COSTECH do you need more of: …..

2. How do you value the services presented by SIDO:
Very important Important Not so important Not important Not applicable
a. The general support from SIDO
b. Any other support, please mention……
What kind of support from SIDO do you need more of: …..

3. How do you value the services presented by LGA:
Very important Important Not so important Not important Not applicable
a. The general support from LGA
b. Any other support, please mention……...
What kind of support from the LGA do you need more of: …..

4. How do you value the services presented by other involved actors?
Very important Important Not so important Not important Not applicable
a. Offers opportunities for training……
b. Support networks and collaboration…….
between different actors ……
c. Support collaborative innovation projects…….
d. Gives technical assistance……..
e. Facilitate product certification……
f. Supporting marketing and market access……..
g. Present opportunities for loans and external funding…….
What kind of support from the other involved actors do you need more of: …..

Questions for companies:

5. What kind of activities regarding intellectual property rights did your company do in 20..?

a. Secure a patent? Yes □ No □
b. Apply for a patent outside of Tanzania Yes □ No □
c. Register an industrial design Yes □ No □
d. Register a trademark Yes □ No □
e. Claim copyright Yes □ No □
f. Grant a license on any intellectual property rights resulting from innovation Yes □ No □
g. Conducts an IP Audit for an enterprise/innovation Yes □ No □
h. Sign disclosure agreements/ contact with employees Yes □ No □
i. Entering a contract with agents for distribution of the product Yes □ No □
j. Any other intellectual asset ……

5. Please answer the following questions regarding your present use of IT

Totally agree Agree to a large extent Partly agree Not agree at all Not acceptable

a. Accessibility to the internet is working very well
b. Use of IT is important for the running of our company
c. IT is vital for marketing our products and services
d. IT is vital for our production
e. IT is vital for the management of our company
f. IT is vital for the innovation of new products and services in our company

6. The character of innovation work done by the company during 20…

g. Several innovation projects: …
h. Cooperation with universities/research institutes Yes □ No □
i. Type of innovation (Goods/processes/organization/business model/social): ….

7. What are the direct results of your innovation work during 20…:

a. Increased range of goods or services Yes □ No □
b. Increased capacity of production or service provision Yes □ No □
c. Improved flexibility of production or service provision Yes □ No □
d. Entering new markets Yes □ No □
e. Improved quality of goods or services Yes □ No □
f. Reduced environmental impacts Yes □ No □
g. Improved working conditions on health and safety Yes □ No □

4.6.4. Questionnaire monitoring the development of the cluster

1. The number of members January-December 20…. has
    a. Increased □
    b. The same as in (three years before) □
    c. Decreased □

2. The number of members 31st December 20…..
    a. In total:….
    b. Enterprises:…..
    c. Researchers
    d. Authorities

3. Number of joint innovation projects initiated by the cluster…….

4. Number of innovations for cluster members?.....

5. Number of strategic long-term partnerships and collaboration for innovation between actors from different sectors,…….....

Please note that all details of the guideline document are available at link of Innovative Cluster initiatives at COSTECH (clusters.costech.or.tz)

5. Outcomes

- Case examples of successful stories

Five clusters that took part in the guidelines' piloting project were chosen through a competitive selection procedure and awarded an innovation fund to put the guidelines into practice through interventions for upgrading their technology. The following are notable outcomes and lessons to be communicated to the relevant targeted users and authorities.

Table 5.1. Clusters and Interventions.

	Name of Cluster	Technological Intervention Involved
1	MECI Metal Engineering	Improved vegetable and fruit solar drying technology to improve the external heating system.
2	Food Processors	Develop banana and breadfruit flour formulations free from aflatoxin-susceptible ingredients.
3	SHIWAMKI Sisal	Automating the existing manual sisal decortication machine and increasing networking in backward production.
4	Babati Bee Keeping Cluster	Five different harvesting and processing machines for bee product.
5	KIWANGO Leather Cluster	Adopting and application of eco-friendly tanning technology.

The performance of the guideline under piloting projects is presented in the following portfolios.

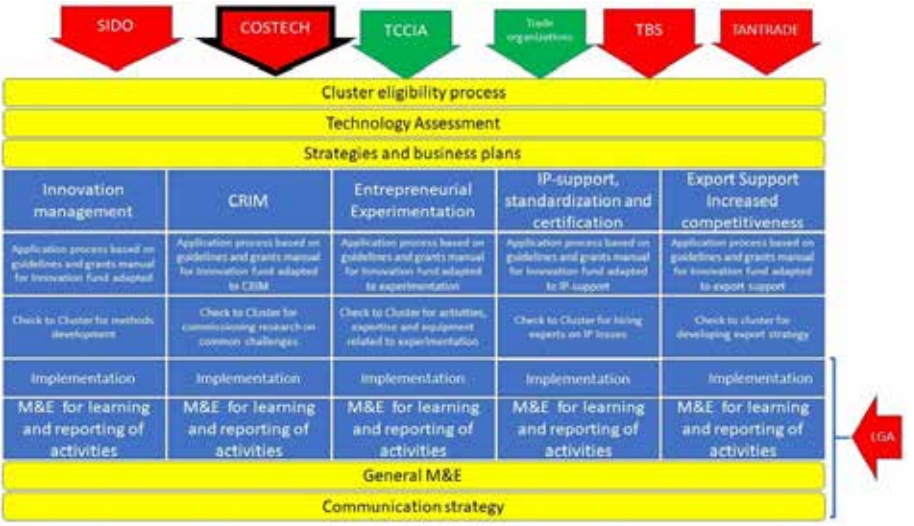
5.1. Outcome One: Innovative Cluster Support Model

Building on experiences from the program period 2017-2023 and earlier phases of the cluster support 2004 - 2015, this model is intended to sustain the development of the current clusters as well as provide appropriate support to newly formed innovative clusters. With such flexibility, there will be opportunities to replicate and adapt when circumstances change. The range of components demonstrated by the current level of maturity is:

- Support to innovation management - for newly formed clusters starting with basic business administration up to more advanced models for knowledge management in mature clusters.
- Support knowledge development through the CRIM guideline linking clusters to researchers and students to develop knowledge for innovations.
- Support for entrepreneurial experimentation, including prototype development, design, testing, user inclusion, etc.
- Support quality improvement and intellectual property protection, to meet standards, and certification requirements and to protect against IP violations.
- Support to market development and exports facilitating opportunities to explore the currently most viable ways to get outreach for the goods or services provided by the cluster to the users/beneficiaries. Export may be an eventual outcome, a goal to strive for or an immediate intention.

While the main actor in this support model is COSTECH, the model presupposes collaboration with several agencies in the Tanzanian innovation system such as SIDO, LGA, TCCIA, TBS, TANTRADE and others depending on the nature of the intervention.

Figure 5.2. The overall cluster support model



The starting point for the general phase is to assess the eligibility of the cluster in an annual process. The eligibility criteria were developed in 2017 and tested on a batch of 15 clusters. Requirements for eligibility cover both managerial and legal aspects as well as developmental aspects such as contributions to national and local sustainable development with specific emphasis on industrialization; innovation capacity; environment sustainability; gender and work conditions. Selected clusters may then get support to assess the production and value chain to define the needs for managerial improvements and innovation potential. This assessment is referred to as Technology and Innovation Assessment (TIA) although it also covers social and cultural aspects. Based on the eligibility and the results of the technology assessment, clusters will get assistance to develop strategies and business plans. Each of these steps in the general phase will contain a collection of cluster data to serve as a baseline for the M&E process.

5.2. Outcome Two: Strengthened Collaborations with Sources of Knowledge

Preconditions for Collaboration with Sources of Knowledge
The experiences from the earlier phases of the program indicated prerequisites needed for each participation partner (COSTECH, SIDO, University/R&D institution and the cluster) for effective collaboration among them. All five piloting clusters adopted the suggested preconditions, which were a key element of CRIM. They were successful in developing formal and informal collaboration that had an impact on the marketability of their products.

The focal persons from respective R&D / universities provided not only technical support and required mentorship to the cluster but also facilitated the assessment of important data from research results. In addition, the focal person facilitated clusters to access and use university facilities (Table 5.1). This evidence tends to indicate that clusters realize the value of universities as sources of important knowledge as compared to the results from the baseline survey, where only 23% of respondents (cluster members) acknowledged University/R&D institutions as an important source of information on technology (Baseline report 2018).

The cluster facilitator proved to be extremely important. However, the motive for facilitators in performing their duty is critical. The experience from the pilot projects showed a diverse range of motive which pose a critical issue on the sustainability of clusters in case there be no right candidate for replacement. The Cluster Coordinating Committee (Board) members are another key precondition. Even though the established committees were not active for all five clusters, their importance can be foreseen. All five clusters organized inception meetings for launching their pilot projects. Participants of the meeting were members of the proposed Coordinating Committee (Board).

The guideline, particularly TIA, facilitated the identification of projects with a common agenda created among the cluster firms based on situational analysis, and identification of needs, problems and challenges. Consequently, trust was built among cluster firms.
Other important preconditions that were not formalized but contributed

informally were a database of research and researchers or research resource lists; having an access point via COSTECH to the database or research resource lists and training of involved partners - COSTECH, SIDO, and cluster firms. The focal person at the university/R&D institution managed to identify and access resources necessary for the pilot projects through their relationship with other experts within and outside the university/R&D institution. (Table 5.1)

Table 5.1. Preconditions for Collaboration with Sources of Knowledge

Cluster	The focal point at University/ R&D	Cluster facilitator	Common agenda
MECI Metal Engineering	Identified SUA staff in the Horticulture department identified specifically for this project	Is the founder of the cluster and among the cluster members.	Prototype of solar dryers
Food Processors	Identified SUA staff in the Food department identified specifically for this project.	Is the founder of the cluster and cluster member who used to be FP from SUA before his retirement. Assisted in accessing five PhD research results to develop the technology.	Collective ownership of food formulation which is free from Aflatoxin
SHIWAMKI Sisal	Staff from CAMARTEC* identified specifically for this project.	A coordinator of REDESO**, an NGO at Kishapu, sharing the development agenda with the cluster. Contributed to both technical and financial support in the execution of the project particularly covering cost field testing and feedback meetings between cluster members and innovators.	Collective ownership of a utility model and an automated and mobile sisal decorticator.

Babati Bee Keeping Cluster	Staff from VETA Babati were identified specifically for this project. VETA Babati is providing space for incubation.	An LGA officer in charge of a Beekeeping section as an expert.	Collective ownership of five different devices for processing bee products, incubation centre and training curriculum
KIWANGO Leather Cluster	A senior lecturer at NM-AIST and expert in leather technology facilitated access to laboratory facilities at TIRDO*** and a researcher under an internship program to work on the project. Is the innovator of the piloted technology and also supports acting as the cluster facilitator.	Is the founder of the cluster and among the cluster members	Collective ownership of leather processing plant.

* The Centre of Agricultural Mechanization and Rural Technologies
** Relief to Development Society
*** Tanzania Industrial Research and Development Organization

Options for Collaboration between Cluster and University / R&D
Three major collaboration options manifested during the piloting projects - formal collaboration based on MoU, Intellectual Property Rights (IPR) and joint knowledge/technology production.

Three clusters, out of the five, signed MoU with respective universities and one with VETA Babati. The areas of collaboration include

- Training students for an active problem-solving attitude within a systematic industrial perspective
- Exchange of and sharing experiences in developing new technology between researchers, cluster members and users of developed technologies
- Joint research activities and joint knowledge and technology production.

The interesting aspect of these MoUs is the recognition and enforcement of benefit sharing of non-structural IPR generated from the collective initiative. For example, the MoU between the Bee cluster and VETA Babati indicated how cluster members will benefit from the operationalization of a newly developed curriculum for a short course on bee management (Table 5.2).

Another means of collaboration is through ownership of IPR (utility model) generated from the co-developing innovation. The guideline on IPR, in addition to informing who owns what from contributions, also helped to unpack both non-structural and structural IPR that emerged from joint knowledge (Table 5.2).

Table 5.2. Different forms of collaboration realized from the pilot projects

MECI	MFCI	Bee Cluster	Kiwango	SHIWAMKI Sisal
MoU with SUA for joint research, student attachments and sharing experience	MoU with SUA for joint research, student attachments and sharing experience. Collective ownership of the resulting food formulation necessitated a collective business model for Commerciallization	MoU with VETA Babati for joint incubation program and training program on beekeeping. The MoU guides the sharing of financial benefits and knowledge from the two interventions between the cluster and VETA Babati.	MoU with NM-AIST. The increased potential of the newly developed system allows leasing to leather processors outside the cluster, hence new income. Also, the improved recipe can be sold as a product.	The upgrade from the pilot project is protected by the utility model granted to the cluster and the innovator. Hence, apart from common ownership of the new machine, a small percentage of earnings is guaranteed for each new machine sold.

5.3. Outcome Three: Prototyping

Prototyping is an experimental process where design teams implement ideas into tangible forms. It involves testing a prototype not only for end users, but also for researchers, intermediary users and regulatory authorities to refine and validate the designs so that technology can release the right and acceptable products, hence more competitive. All five piloted projects demonstrated a scenario where there was detailed information regarding the performance of the new desired products, the processing needs and the output requirement. Hence, the prototyping model was employed.

In addition, the presence of cluster firms consented to iterative development along with prototype development. (Table 5.3). All this was possible because of guidance from CRIM, TIA and IPR guidelines.

Table 5.3. Summary of contributions of different actors in each project during prototype development.

Cluster and project	Actors and their contribution to Innovation processes	Outcome
Sisal Cluster (automatic sisal decorticator)	Observed challenges by cluster members were communicated to the external innovators. The researcher provided technical advice on the quality of materials, drawings and established user manual. Expertise and experiences shared from designing to the end product from different actors during testing and demonstration. Value engineering with expertise from CAMARTEC. REDESO supported in field testing. Patent drafting and filing by IP expert.	A working prototype of an automatic decorticator machine The improved design is protected by the Utility Model.

Morogoro Food Cluster	The results of five PhD students' research confirmed the problem, indicated different aflatoxin-safe ingredients available, provided good manufacturing practices, selected ingredients of less aflatoxin and gluten-free and identified crops easily affected by aflatoxin. SUA – lab facilities and expertise, for example, extruder, soya dehullers. Cooking parameters established by cluster firms. TBS – analysis and certification of the food formulation. Consumer feedback helped in the identification of reasons for an unpalatable test of the first formulation and led to the optimization of processing parameters.	Food formulation free from aflatoxin. Protocol for processing soya flour. Protocol for processing cassava flour. MoU with SUA on accessing facilities.
KIWANGO leather cluster	Procedures in the form of a PhD Thesis. Lab facilities from the Tanzania Industrial Research Development Organization (TIRDO). Skills, experiences and knowhow of cluster firms used in refining parameters. Optimization of parameters for using maize bran, papaya and extractor design. Development and testing new system recipe for the tanning process of leather. Dar Es Salaam Institute of Technology (DIT Mwanza) piloted the prototype.	Leather processing system. Optimum parameter for using maize bran and papaya, extractor design. A new system recipe for the tanning process of leather.

Bee cluster	Design of existing devices from Tanzania Wildlife Research Institute (TAWIRI), Centre for bee product processing (Nashipai) at Makuyuni, District Moduli-Arusha, BDTL-Arusha, ABC-Usa River na Makuyuni and Bee Training College in Tabora. Expertise from VETA Manyara. Laboratory facilities at VETA MANYARA. Experience of cluster members in the beekeeping industry.	Prototypes of the five devices. Training curriculum for a short course on beekeeping. Incubation program.

The Technology and Innovation Assessment guideline (TIA) is designed not only to guide technology upgrading but also identification and engagement of researchers and other actors in the production chain. Hence, the application of TIA in the pilot project allows the identification and engagement of the right partners and therefore requirements for the upgraded technology to reach the market, which was considered and taken care of.

An example is the development of an automated decortication machine (Table 5.1). This innovation project involved firms of the sisal cluster in Kishapu District, an R&D institution (CAMARTEC), an external innovator, an IP Consultant, an NGO working on community development programs (REDESO), TCCIA and sisal farmers. A researcher from CAMARTEC among other things investigated the performance-cost effectiveness (value engineering) which recommended additional parts but also fewer cost materials (value engineering report).

The design process and prototyping included planned periodical technical meetings as well as following and testing the functions with the cluster firms. These meetings allowed the designer (innovator) to link science-based and experience-based knowledge, while maintaining its functionality for cluster firm requirements. Thus, an automated sisal decorticator was designed according to the needs identified in the dialogue between the firms of the sisal cluster, the innovator and the researchers.

In addition, the guideline on IP issues between and within cluster stakeholders offered fundamental knowledge and options, which were cost-effective solutions to formal and non-formal knowledge asset management.

Results from the pilot projects for the five clusters revealed several non-formal knowledge assets, which without the guidelines could not be realized and contributed to the realization of the expected impact of the upgraded technologies and methods.

Part II : Funding Innovation

Part II in the handbook focuses on the crucial question of how to fund innovation to make innovation achieve societal impact. This part serves as a practical guide for navigating this process.

This part of the handbook shares best practices from COSTECH based on experience from more than five innovation fund windows administered to different categories of innovators and innovation intermediaries. Additionally, it provides a comprehensive overview of essential considerations that should guide the selection, disbursement, and management of innovation funds.

In addition, this part is dedicated to advancing the National Fund for the Advancement of Science and Technology (NFAST) and other funding agencies' programs. The objective is to enhance the ability to bolster innovation ecosystems, with a particular focus on fostering innovation capacity and nurturing these ecosystems to drive impactful outcomes.

6. Introduction

The NFAST was established under the terms of Part V of Act No 7 of 1986 creating the Tanzania Commission for Science and Technology (COSTECH). The goals of NFAST include supporting local research and development (R&D), technology transfer, and Science, Technology, and Innovation (STI) initiatives following national priorities through grants and awards. COSTECH through NFAST provides grants to research, innovation and research infrastructure projects based on the requirements of the Research and Innovation COSTECH Grants Manual.

When established, NFAST was supporting research only. The Innovation Fund scheme was introduced in 2018 to create platforms for innovative activities by providing incentives for collaboration; promoting demand-driven and adaptive research, and supporting innovation intermediation roles that improve dissemination of new technologies, productive partnerships, and links to markets. The scheme aims to bridge the gap in financing for innovation processes and to support innovators and their links to public institutions, private entrepreneurs, and other key factors such as producers and service providers.

In the same year 2018, through Sida support, NFAST launched the first call for innovation grants. The overall objective of the call was to strengthen the innovation system in Tanzania by supporting innovations that could contribute to achieving the sustainable development goals (SDGs). Specifically, the call intended to

- Increase the capacity to innovate among researchers, private entrepreneurs, SMEs and others that has a potential for social, economic and environmental development,
- Increase capacity for collaborations between academia, public and private sectors (from both formal and informal) through various platforms,
- Improved capacity for innovation fund management mechanisms.

Subsequently, NFAST launched calls for innovation funds annually for different target groups depending on the sources of funds. The funds were sourced from different development partners and the Government (Table 6.1).

Table 6.1: Sources of Innovation Fund and Targeted Groups

Sources of innovation fund	Programme and target group	Number of supported projects	Type of support
SIDA	Open call of innovation fund (small and large grant) – 2018.	17 (15 small and 2 large)	Prototype development, Technology development and commercialization of proven technologies
	Closed call to Innovative clusters – 2020. Members of the cluster are SMEs in a specified sub-sector.	5 (form five clusters)	Upgrading of technologies, technology transfer and acquisitions
	National STI Competition Award (MAKISATU) – 2020. All interested innovators from informal and formal sectors are eligible.	70	prototype development, technology development and commercialization of proven technologies
Human Development Innovation Fund (HDIF)	Innovation Fund support – 2018 open to all innovators from informal and formal sectors.	15	prototype development, technology development and commercialization of proven technologies
	Support to establishment of Innovation Spaces 2018 .	15	support to technology and innovation intermediaries, from private and government institutions
duct pro	duct pro	duct pro	duct pro

Government of Tanzania	Closed Innovation Fund support – 2020 to researchers benefited from research fund from NFAST.	3	Upscaling research results
	National STI Competition Award (MAKISATU) 2019, 2021 and 2022.	59	Prototype development, technology development and commercialization of proven technologies
Funguo	Buni Young Women Program.	5	Seed grants to support prototype development.

7. Landscape of Funding Categories at COSTECH

The landscape of funding categories refers to the different types of fund support offered by NFAST to various innovative projects, initiatives, or businesses. Each funding category has its unique characteristics, requirements and objectives. The objectives influence design choices, including timeframe, grant size, and actors to be involved. For instance, digital innovation can be prototyped fairly quickly, while infrastructure is needed for hardware-based technologies to develop a prototype. Even more sophisticated facilities are needed for biotechnology, which requires numerous actors. For the change of innovation culture to become sustainable in organisations, it probably takes a long time.

Below are four funding categories offered by COSTECH according to its Research and Innovation Grants Manual.

7.1. Fund for innovators (small and large grants)

The fund caters for innovation at three levels of development including prototype development, technology development and pre-commercialization/ commercialization. Funds for each stage have different objectives and targets.

7.1.1. Prototype development

Funding for prototype development is a crucial step in bringing a product or idea closer to reality. Before funding, it is important to consider key factors to ensure the prototype development process goes smoothly. The objective is to demonstrate the functionality and potential of the new technology. A tangible representation helps the funder to understand the vision hence increasing the chances of successfully securing further funding:

7.1.2. Technology development

The fund for technology development helps to answer questions about whether the developed technologies work in a real environment. By providing the resources to determine viability and market demand, it advances innovators' inventions and experiences along the commercialization pathway and makes the inventions more attractive to potential partners. Additionally, it minimises unnecessary risk by identifying and addressing any logistical issues that might interfere with the success of utilisation and achieve considerable use.

The specific issues to be considered include

- Technical challenges that need to be addressed before scaling up, meaning transparency about the technology's readiness level,
- Commercialization pathway with steps required from the current state to a market-ready product (milestones, timelines, associated technologies and the resources needed for each stage) and how to package them,
- Necessary expertise to successfully develop and commercialize the technology.

7.1.3. Pre-commercialization/commercialization

Technology commercialization is the process of transitioning technologies from a prototype or the research lab to the marketplace. Contrary to prototype and technology development, which in most cases focus on attracting funders, pre-commercialization/ commercialization in addition to funders is also targeting the potential customer and investor. At universities and R&D institutions, this activity is complementary to the process of publishing research findings. Commercialization helps create new start-

up businesses or expands the product lines of existing enterprises. For successful commercialization, the following are needed.

- Ensure that the product is fully developed, refined, and ready for mass production.
- It should meet quality standards and regulatory requirements.
- Assessment of how it solves the existing problems or fulfils existing needs better than existing alternatives and clear target.

7.2. Upscaling of research results

Technology upscaling is about turning research results into a practical and impactful solution (commercialization). However, the reasons making this category require special attention include:

- first, the design of the research projects, which places more emphasis on scientific impact;
- second, the nature of the source. The academic environment in terms of the policy environment of academic institutions is more career and demand-oriented than demand-driven hence does not foster commercialization and
- third, the perceptions of researchers toward innovation are more linear than systemic.

Thus, for successful upscaling the following need to be well insured. To conduct IP audit and IP due diligence will highlight the kind of IP property, IP assets and IP capital included in the invention that might need protection or royalty before upscaling. Assessing the manufacturing process and requirements, scalability, and potential challenges in scaling up production is necessary as well as having a clear pathway to scaling up the technology. Addressing potential regulatory challenges early can prevent delays in commercialization.

7.3. Funding for innovative cluster initiatives

Funding innovative clusters involves supporting groups of interconnected SMEs, companies and research institutions in a particular industry to foster innovation, collaboration, and economic growth. Funding innovation in the cluster setup enhances innovation and collaborative research for instance through prototyping.

The close proximity between organizations in a cluster facilitates the exchange of knowledge, ideas and expertise hence attracting more participants and fostering a self-reinforcing cycle of innovation, collaboration, and growth. Thus, when considering funding for innovative clusters, there are preconditions that are not taken into account by NFAST grant manual but are included in the call as a special requirement that makes it differentiated from funding normal innovation projects. The requirements include the need for partnership with a research institution and the proposed project should benefit all members of the cluster and encourage competition among the cluster firms. Implementation of extra requirements for this category is guided by Innovative Cluster guidelines, which are available on the COSTECH website of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*

7.4. Funding for organisational innovation intermediaries

Funding innovation intermediaries, such as innovation spaces, incubators and technology transfer offices, can bring about several valuable benefits to both the funding organization and the broader innovation ecosystem. In essence, funding innovation intermediaries help catalyse innovation, support start-ups, and contribute to the growth of vibrant and dynamic entrepreneurial ecosystems. It is an investment in both the future of innovative technologies and the broader economic and social benefits they bring. Observed benefits from funding innovation spaces through NFAST include nurturing start-ups and entrepreneurs by offering mentorship, training, resources and access to networks. By funding these innovation spaces, NFAST helps new businesses navigate challenges and increase their chances of success in grant competitions.

Another benefit is innovation ecosystem development. NFAST funding for the establishment of innovation spaces within universities contributes to building a supportive infrastructure that encourages collaboration, knowledge sharing, and resource allocation within the universities as

well as fostering collaboration that leads to networking and partnerships locally and intentionally such as connected hubs initiatives under South Africa Innovation Connect (SAIC) project.

It is of vital importance to learn from the experiences that innovation is happening in different innovation ecosystems, which in most cases are not well compatible such as academic communities, start-up communities and entrepreneurship communities. The nature of innovation, their growth rate, actors and their roles, relationship and connectivity, logical actions and outcomes involved are different. Thus, funding these organisational intermediaries like innovation spaces, which in principle promote diversity and inclusion, helps create opportunities for underrepresented groups and promote a more inclusive entrepreneurship environment.

Other observed benefit is rapid innovation, learning and knowledge transfer.

8. Designing the Fund Categories

Funding innovation involves providing financial support to ideas, projects, or initiatives that have the potential to bring about novel and valuable products, services, or processes. Several elements are involved in making funding innovation successful apart from money. These can vary depending on the context and the type of innovation being supported. *The selection process for eligible project proposals is among the major elements that determine the success of any funding category.* Based on experiences, COSTECH / NFAST has established rigorously designed selection steps and criteria, which are well stipulated in the COSTECH Research and Innovation Grants Manual.

COSTECH visualised the selection process considering the entire spectrum of the innovation process from potential sources of new ideas to the expected societal impacts. It also has well-thought-out key players along the same innovation value chain and their characteristics.

This visualisation was important in designing the application form, which captures all needed information, from describing the innovation project to effective evaluation tools. Thus, the selection instruments in the grant's manual focus on compliance with the technical requirements and desires of the actors in the subsequent stages of the innovation process.

As a result, *COSTECH's approach to funding innovation focuses as much on capacity building as it does on financial support.* Consequently, over the years, COSTECH experimented and refined the granting process and ran innovation grant funds, choosing different approaches for different categories of innovators depending on what is wanted to achieve.

In addition, the grand manual offers complementary support to make sure the fund support contributes not only to innovation and innovators but also to the innovation ecosystem as a whole. The other support granted by the manual includes mentorship and coaching, showcasing and dialogues with key players in the ecosystems. The identification and justification for the need for this support is determined by COSTECH staff together with innovators at different steps of selection monitoring and evaluation such as due diligence (pre-award assessment) and technical field visits.

Outlined below are the steps involved in the selection process and an explanation of the key selection criteria for each step, embedded capacity-building components and outcomes.

8.1. Steps for selection of awardees of innovation fund

A total of nine (9) steps are involved in the selection process. These steps are designed in such a way that they complement each other, but apart from guiding the selection process it also provides room for training and coaching to applicants. Steps 5, 8 and 9 are just for decision-making and disbursement and are not included below.

Step 1 Call for application

The call for application has two main parts, the call information and the application form. The call information provides the purpose of the call, context, and the type of funding scheme, which are limited to innovative solutions, prototype development, technology development and commercialization. It also has lists of fundable activities and assessment criteria.

The application form among other things requires the applicant to briefly describe the project by mentioning the need that the project intends to address, the proposed solution and the likely commercialization path/ likely route to market for the proposed solution as well as target, team members, list of competitors and position of IPR. These requirements are designed in such a way that an applicant is required to think beyond the

technical potential of the solution and consider other important aspects such as business and manufacturing requirements. This information, if well provided, will help reviewers in assessing the potential of the idea in achieving the intended expectations.

Table 8.1. Evaluation criteria, guiding questions in the application form and outcomes.

Evaluation criteria	Guiding question in the application form	Expected outcome that contributes to the success of innovation
Viability • Affordability of the solution to the targeted end user • Sustainability of the project beyond the funding period • Practicability - How realistic is the innovation	• What is the problem, the need that the project intends to address? • What is the proposed solution? • What solution has either been or is still to be developed? • What is the commercialization path of the solution?	• Understanding what knowledge assets are included in the solution and who owns them helps in assessing the team composition, IPR strategy and eventually the right business model. • Understanding the uniqueness of the solution will help in measuring the extent of competition in the market. • Ensured considerable use of the intended solution through commercialization.
Innovation Newness or significance improvement of the available product, service or business model in Tanzania	• How is the awareness of innovator on IP issues/protection?	• awareness of both structured and non-structured IP assets embedded in the innovation project increases value proposition and product competition

The societal **impact** aimed to be achieved by the project.	• What are the societal impacts aimed to be achieved by the project and how will it be measured? • How will the impact be measured in your project? • Who are the competitors with the same or similar offering to yours? • Describe the identified problem, and need and address it by the project as well as possibilities and opportunities. • How did you validate this need? • How will the goal and deliverables of this project assist in addressing the need? • List the groups of people who have this problem/need. • What is the potential for clients to pay for the solution?	• Utilities and improvements are created in ways that are better than existing ones. • The problems/needs of the target group are likely to be solved competitively. • Opportunities to target group identified and fully utilised.

Team effectiveness Availability and accessibility of necessary competencies. Commitment of the team members in the innovation project	• Who is the person/ team/ organization responsible for each activity?	• understanding of the availability and commitments of partners and stakeholders in the innovation process. • understanding of the availability of intermediaries, which are needed to reach the target groups.
The **commercialization** potential of the innovation	• What is the likely route to market for your proposed solution? • Is there any associated technology and its application (i.e. how can it be used)?	• Understanding how to package generated knowledge assets to deliver/transfer utility (service, goods, documentation, training). • Understanding how the assets are distributed.

Step 2 Screening of applications

This step is done internally using a tool specifically for the identification of eligible proposals according to the requirements in the call information and the objective of the call. In addition, the tool also captures more information that helps in planning for subsequent steps as well as monitoring interesting trends such as:

- *Sectors and types of invention:* Helping to determine expertise required by reviewers and judges during pitching. This information can be used in monitoring the trends of emerging technologies in ecosystems and forties
- *Location (regions)of applicants:* It is a good measure of the

effectiveness of the means of communication used in the advertisement of the call. For example, initially, when social media were used as a major means of communicating calls, the majority of applicants were from cities and big towns excluding innovators from rural communities. Now multiple means of communication are used including local radios and note boards at each district's Local Government offices.

- *Type of support needed:* Since the establishment of the innovation fund in NFAST the trend indicates a shift from applicants asking money for acquiring materials for prototype development only to now where more than 60% of the requested fund goes to purchasing working tools and associated technologies for mass production.

- *Any previous support:* The information collected helps during due diligence to assess experience in project management and assess the contribution of intermediary organization building capacity to innovate

- *Team member:* The information provides an indicator of collaboration, particularly between grassroots innovators and researchers. Hence, it justifies for provision of special invention or motivation for collaboration. For example, in the first call collaborative projects were about 4% only. As a result in the second call, special incentives were designed to encourage collaborative projects.

More elements are introduced in the tool depending on the nature of the call e.g. if the call is closed to a certain group, then specific requirements are included such as stage of development, and business model.

Step 3 Review of applications

Review for innovation proposals is done in a panel and not by individuals for research proposals. Each proposal is reviewed by at least three reviewers. The results are compiled and discussed in a panel for harmonization. Since the panel is composed of different expertise and experiences, individual reviewers have a chance to ask colleagues in case they need clarification of concepts not familiar. Also, the panel contributes to constructing feedback for all applicants. This information is provided

to judges during pitching for scrutiny and further assesses and advises applicants accordingly.

COSTECH staff, who are the secretariat to the panel also assist in explaining some of the concepts to reviewers before and during the review process based on their experience. The experiences of the secretariat show that among the reasons for discrepancies among reviewers is the interpretation of the languages used by the applicants in responding to questions in the call. This challenge has been taken and requested for applicants to send video clips to complement the application form.

Step 4 Project pitching

Pitching plays a crucial role in the selection of awardees for the innovation fund. When a startup, entrepreneur, innovator or researcher is seeking funding from an innovation fund, they typically need to present their ideas, projects, or business to a selection committee or panel of judges through a pitch. The interaction of judges and the applicants offers a unique opportunity for unpacking necessary information from the applicants that has not been described adequately in the application form. This interaction is designed in such a way that the shortlisted applicants are well prepared to develop good presentations and judges are identified based on their expertise, which is in alignment with proposed projects.

The preparation for pitching presentations ensures that the following key information is well presented

- value proposition,
- business model,
- scalability,
- team strength,
- competitive analysis and
- most importantly passion and conviction.

A compelling pitch not only presents the innovation effectively but also convinces the judges that the awardee has the capability to bring the innovation to fruition successfully.

Step 6 Due diligence (pre-award assessment)
Once an application has been reviewed and approved for funding, a pre-award assessment or due diligence will be performed on the host institution before agreement execution and the funding is finalized. It should be noted that all funds will be disbursed through the host institution. A host institution can be any legal entity either private or public. The track record of the recipient will also be conducted in the case of medium enterprises. The objective is to conduct a physical verification and identify the capacity gap and risks of the host institution and potential guarantee in the key areas such as legal status, technical capacity and internal control.

Verification of the technical capacity helps to ensure the innovative capacity of the innovators or startups, appropriateness of the budget and avoiding disputes related to IPR. This is achieved if an innovation team has

- relevant qualifications and experience,
- a qualified human resource for research/innovation management is available,
- the existence of collaboration with other institutions in research/innovation,
- requirements for IP protection, legal authorization or certification are not part of the project activities,
- team members/key partners signed disclosure (confidentiality) agreements and qualifications of a mentor for the project are known,
- availability of any patents, product development and new technologies from previously funded projects in the past 5 years. The aim is to assess the innovation capacity of the innovator but most importantly assess IP strategy and is used in the commercialization of innovation in different categories of applicants

There is also a need for agreeing on mentorship and dialogues with the host organization.

Step 7 Pre-award training and revision of work plans

This step is conducted just before or at the initial process of awarding the funds and it targets the winners as a compliance check. It is mainly tailored training towards the identified needs of grantees from previous steps. It also aims at enhancing general knowledge and skills in innovation management, identifying in-depth needs for mentorship attachment and providing a connecting platform for guarantees for future collaboration and capacity support.

During this training, the project plans, budgets and impact process are consolidated and agreed upon. Participants of the training include members from each winning organization/entity (such as the leader, technical person and finance personnel) and representatives of the assigned host institution/mentors. The training workshop covers the following among other things

- assets and property tracking,
- impact process and developing indicators to measure impact. The Impact Case Review Canvas is used to ensure the resources are used towards expected impact and not otherwise. Also, the tool predicts what impacts are possible to be achieved hence justifying further investment in the project.
- work plan or milestone setting and budget,
- verification to ensure all requirements both direct and associated are planned and budgeted. Associated requirements include assorted technologies to support processes and production, and meetings of stakeholders to validate the technology. In addition, it helps to cross-check if funds are allocated to fundable items only.

Table 8.2. Summary of the 7 steps for selection of awardees of innovation fund

Steps	Tool
STEP 1: Call for application	Form including reviewing criteria
STEP 2: Screening of applications	Guideline for screening of innovation proposal
STEP 3 Review of applications	Evaluation criteria for applications • reviewers conflict of interest declaration form • confidentiality statement
STEP 4 Project pitching	Checklist for judges
STEP 6 Due diligence (Pre-award assessment)	Pre-award assessment form which include: • legal status of the host institution, • the technical capability of the innovator/startup, • key activities for the success of the project are budgeted • financial statement and internal controls and governance
STEP 7: Pre-award training and Revision of Work plans	• milestones • impact case study • monitoring and evaluation • reporting format

8.2 Mentoring and Coaching

Mentoring is a program aimed at supporting and encouraging innovators (winners of awards) to manage their own learning in order for them to maximize their potential, develop their skills, improve their innovations and realize their dreams. In this context, mentoring includes training, support, encouragement, advice, and guidance from people who have 'done it before'. The process allows mentors and mentees to make useful networking connections, and have access to role models. COSTECH is responsible for identifying mentors from the relevant organizations including industries. Mentors are engaged formally and COSTECH allocates funds (from the innovation fund) to cover for their travel and some allowance when necessary under the agreed ToR Form.

Part III : Lessons Learned

9. Questions and Comments

The lessons learned can be presented in the format of a list of questions for an increased understanding and efficient procedures to follow. The questions are presented below with clarifying comments.

I. Is there a complementarity of innovation fund and innovative clusters?

Comment: Innovation funds and innovative clusters can complement each other effectively to drive technological development, economic growth, and innovation. The complementarity between these two approaches lies in their ability to address different aspects of the innovation ecosystems and support different stages of innovation.
Below are experiences-based examples, in which innovation funds and innovative clusters work together.

Knowledge exchange
Innovation fund focuses primarily on providing financial resources but may not have a mechanism in place for knowledge exchange or technology transfer. But clusters are hubs for knowledge exchange. They bring together SMEs, research institutions, and experts, creating an environment where knowledge and expertise can flow freely.

Ecosystem building
While they play a crucial role in providing financial resources, innovation funds may not focus on building the broader innovation ecosystem. Innovative clusters contribute to the overall ecosystems by connecting various stakeholders, fostering a culture of innovation, and supporting the growth of a regional innovation network.

II. What are the roles of innovative clusters for COSTECH in technology acquisition, technology transfer and innovation?

Comment: As this question is key for understanding knowledge utilization and management, this comment needs some space. Innovative clusters act as catalysts or play pivotal roles in technology acquisition, technology transfer, and innovation by facilitating collaboration, knowledge sharing, and access to resources. In practice, these concepts are interconnected, and clusters often engage in all three to varying degrees to stay competitive and foster technological advancement. Technology acquisition and transfer provide the foundation for innovation, as organisations build upon existing knowledge and expertise to create innovative solutions. The concepts are distinct but closely related in the realm of technological development and progress. Here are the key differences between these terms.

Table 9.1. Concept, definition, technology source, purpose

Concept	Definition	Source / Nature of technology	purpose
Technology acquisition	The process of obtaining or acquiring new technology, often from external sources, to be used within an organization or for a specific purpose	Various means, such as purchasing or licensing technology from other companies or collaborating with research institutions	To gain access to existing technologies that can improve efficiency, competitiveness, or the development of new products and services
Technology transfer	The process of sharing or disseminating technology, knowledge, or know-how from one organization or entity (typically a research institution or company) to another for the purpose of commercialization or further development	Often involves the transfer of intellectual property rights, patents, or technical expertise from the source to the recipient	To bridge the gap between research and practical application, enabling the recipient to leverage the technology for economic or societal benefits.

Innovation	The creation, development, and implementation of new or significantly improved products, services, processes, or business models that bring added value to customers or society	It encompasses a wide range of activities, including research and development, creative problem-solving, and the introduction of novel ideas or concepts.	To improve existing solutions, address unmet needs, or capitalize on new opportunities. It often involves the integration of multiple technologies or the development of entirely new ones

Specifically the three concepts differ in ownership, focus, direction, outcome and motivation.

Table 9.2. Concept, ownership, focus, direction, outcome, motivation

Concept	ownership	focus	direction	outcome	motivation
Technology acquisition	Obtaining technology from external sources	Primarily concerned with acquiring or disseminating existing technologies	Often one-directional processes, with technology moving from the source to the recipient	The acquisition and application of technology,	Desire to leverage existing knowledge and capabilities,
Technology transfer	Typically involves the sharing or licensing of technology developed internally or by a partner organization				
Innovation		Creating something new or improving upon existing solutions	Multidirectional process that may involve the synthesis of various technologies and ideas	The creation of new products, processes, or services	Driven by the quest for novelty, competitive advantage, or societal impact.

III) Innovative cluster guidelines are meant for whom and why are they important?

Comment: The five guidelines for fostering innovative cluster development extend their significance beyond just cluster facilitators and focal persons. They are equally relevant and valuable for all stakeholders involved, including LGA, SIDO, COSTECH as well as policymakers.

The guidelines are important as they offer concrete and practical assistance for the clusters. They provide essential tools to navigate the initial phases of cluster development and to enhance innovation capabilities as the cluster advances. Furthermore, they incorporate a monitoring and evaluation framework to track the progress of cluster firms. In the later stages, these guidelines also promote exports, if desired by specific cluster firms.

For other actors engaged in the process, these guidelines serve to clarify their roles and responsibilities, while also encouraging necessary organizational adjustments and transformations. This aspect is particularly relevant for the university and COSTECH, as it supports their efforts to adapt and thrive in the evolving innovative cluster landscape.

IV. Is it true that too much of research results remain on shelves?

Comment: The shift from 8-millennium goals to 17 SDGs impacted several issues in the innovation ecosystems. It demands a more systematic approach to identify and judge the innovation potential of the research results. Thus innovative platforms like innovative clusters are needed where a collaboration of researchers and business people are jointly working together to find solutions. As a result, knowledge from research institutions is moved through an integrated knowledge transfer as opposed to traditional transactional technology transfer.

The research project is not designed/identified with the intention of future commercialization. The selection process of research does not consider societal impact thus the expected end result is a lab prototype (TRL).

Upscaling of research results involves technology development to achieve a functional prototype (costly), a measure of its commercialization

potential needs a clear understanding of not only technical requirements but also business requirements and manufacturing requirements, which the researcher might not be relevant to develop eligible proposal/review for eligible proposal.

Concerning support to the Innovative clusters the innovation fund is strategically used for transfer of knowledge in a more integrated mode than in the traditionally linear one.

V. Why consider the commercialization pathway and considerable use of invention in the proposal for an innovation project or at the beginning of an innovation project?

Comment: The subsequent stages after technology development might demand associated technologies and /or special requirements for easy processing of raw materials, application and mass production. All these need to be available, accessible and manageable. Experience showed that the majority of failed projects particularly upscaling projects were due to not fulfilling requirement the subsequent requirements for manufacturing and mass production hence, the loss of invention which would otherwise saved
The availability of raw materials should be adequate, and accessible for realizing commercialization. Compliance with regulatory requirements and procedures is also needed.

This question concerns not only technology but also non-tangible products and methods

VI. What is the role of Intellectual property rights in innovation, structured versus non-structured IPR?

Comment: Structured and non-structured forms of intellectual property rights (IPR) both play essential roles in innovation, but they serve different functions and have distinct impacts on the innovation process. However, identification of these IPs particularly non-structural is not easy at the sources of knowledge. The IP guideline for innovative clusters are equipped with tools to identify both forms of IP. The following is a breakdown of their roles.

Structured IPR
Structured IPR, which includes patents, copyrights, trademarks, and other legally recognized forms of intellectual property, provides creators and inventors with legal protection for their innovations. This protection serves as an incentive for individuals and organizations to invest time, effort, and resources in developing new ideas, technologies, and creative works.

Structured IPR allows innovators to *monetize* their intellectual property through licensing, selling, or using it as collateral for financing. This revenue generation can fund further research and development, leading to continuous innovation.

Structured IPRs establish clear *ownership* rights, which prevent unauthorized use, duplication, or infringement of intellectual property. This clarity in ownership encourages collaboration and partnerships, as parties are more confident in sharing their innovations.

In the event of infringement or disputes, structured IPR provides a legal *framework* for seeking remedies and damages, ensuring that innovators have recourse to protect their intellectual property.

Patents, in particular, can facilitate *technology transfer* through licensing agreements. Companies can license their patented technologies to other entities, promoting the diffusion of innovations across industries and regions.

Non-structured IPR
Non-structured IPR includes *tacit knowledge*, trade secrets, and know-how, which are often difficult to codify or protect through traditional legal means. These forms of knowledge are critical in innovation as they encompass practical insights, skills, and expertise that are essential for creating and refining innovations but not documented with the exception of projects in Innovative clusters where a special tool for IP management is used.

Non-structured IPRs encourage collaboration and knowledge sharing within organizations particularly clusters and across innovation networks. The majority of innovators rely on informal knowledge exchange and experiential learning to develop innovative solutions and techniques.

Non-structured IPR is particularly valuable for *incremental innovation*, where small but significant improvements are made to existing technologies or processes. These improvements often arise from the collective experience and insights of individuals within an organization or cluster.

Trade secrets and tacit knowledge can provide organizations with a *competitive advantage* because they are not publicly disclosed. However, innovative cluster guidelines for protection and management are needed.

In some cases, non-structured IPRs are used to mitigate the risks associated with structured IPRs. For example, individual innovators may rely on trade secrets or proprietary knowledge to protect aspects of their innovations while seeking patent protection for other aspects.

VII. Should NFAST continue to support technologies in one sub-sector of a national economic area?

Comment: The decision to continue supporting technologies in a specific sub-sector of a national economic area should be based on a thorough assessment of various factors, including the funder's goals, the potential of the sub-sector, the stage of maturity of the innovation ecosystem, comparative advantages and its impact on building the innovation ecosystem. Here are some considerations:

- Development regulatory requirements for innovations such as TBS standards and others need justification for the existence and importance of innovation
- Build a base of relevant associated technologies for a particular technology.

Part IV : Key Achievements and Recommendations

10. Key achievements

10.1. Part I / Innovative clusters

Innovative clusters, which are geographic concentrations of interconnected companies, service providers, and associated institutions, create an ecosystem that fosters collaboration, knowledge exchange, competitiveness, innovation and sustainability.
Besides the noted achievements below in each of these areas is the key achievement, namely

the 5 guidelines for replicating the innovative cluster model.

Collaboration

- Established clusters, triple helix collaboration and innovation systems to support innovation and foster job creation.
- Capacity built for innovation intermediaries.
- Capacities and competencies built for innovation processes among the involved actors including cluster facilitators and members, universities/R&D institutions, COSTECH, LGA and Governmental staff members.

Knowledge exchange/technology transfer

- Identified and implemented the conditions and infrastructure for knowledge transfer and knowledge co-creation within different economic sectors in Tanzania.
- Linked science-based and experience-based knowledge,

Competitiveness

- LGA's capacity to analyze and support the situation for local economic development and the possible contributions of the clusters to job creation, value addition to local products, specialization and skills development as well as the opportunities for diversification of agriculture, industry and services in their region.

- Ownership of IPR generated from the co-developing innovation. Unpack both non-structural and structural IPR that emerged from joint knowledge.

Innovation

- Established clusters, triple helix collaboration and innovation systems to support innovation and foster job creation.
- Developed Tanzanian Innovation ecosystems when it comes to innovative clusters, and innovation hubs at universities and FDCs.
- Developed COSTECH as a national driver for the development of Tanzanian innovation ecosystems.

Sustainability

- Kept innovative clusters sustainable for 2 decades.
- Received acknowledgement also with resource allocation from the Government.

10.2. Part II / Funding Innovation

10.2.1. Innovation fund as a tool to increase capacity to innovate

The innovation fund proved to be a powerful tool to increase the capacity to innovate to individual innovators and organizations, particularly innovative clusters. It provided financial resources and support to foster a culture of innovation and drive the development of new ideas and technologies.

How an innovation fund can effectively boost innovation capacity in Tanzania is presented in the following.

- The fund provided seed capital to start-ups and early-stage ventures, helping them turn their concepts into market-ready products or services. These seed funding were critical during the early stages of innovation.

- The fund supported efforts to bring new products and solutions to the market, including market research, product development, and marketing.
- Developed COSTECH as a national driver for the development of Tanzanian innovation ecosystems.
- Innovation often involves taking risks. The fund targeted high-risk, high-reward ventures that may need to struggle to secure traditional financing due to their experimental nature. That led to breakthrough innovations with significant impact.
- The fund facilitated access to expert mentors, advisors, and consultants who guided innovators and start-ups in refining their ideas, building their businesses, and navigating challenges.
- The fund supported organized innovation challenges, hackathons, and competitions that stimulated creativity and provided innovators with a platform to showcase their ideas.
- The fund promoted collaboration by facilitating partnerships between universities, research institutions, businesses, and government agencies. This network of collaborators implemented under innovative cluster initiatives shares knowledge and resources, driving innovation collectively.
- The fund supported the development of innovation hubs, incubators, and accelerators, thus creating physical spaces where innovators work, collaborate, and access resources and mentorship.
- Innovation often involves creating intellectual property. The fund assisted innovators in securing patents, copyrights and trademarks, protecting their innovations and encouraging further development.

By strategically deploying financial resources and support, an innovation fund can increase the capacity to innovate and contribute to economic growth, competitiveness, and the development of cutting-edge technologies. It nurtures a culture of innovation and provides the necessary resources for individuals and organizations to explore, experiment, and create solutions to societal challenges.

10.2.2. Showcasing and exhibition of innovation

Showcasing and exhibitions of innovations at different levels of development can serve as powerful tools for building and nurturing an innovation ecosystem. COSTECH supported innovators to participate in four National Innovation Week. These events create opportunities to showcase innovative ideas, products, and technologies, foster collaboration among various stakeholders, and attract resources and support. The following is how these showcasing and exhibitions contributed to building an innovation ecosystem in Tanzania:

- Visibility and recognition of startups, entrepreneurs, and innovators, which attracted attention from potential customers, partners, and mentors, helping innovative ventures gain traction and credibility.
- Networking and collaboration at these events led to collaborations, partnerships, and knowledge sharing, which are essential for ecosystem growth.
- Demonstrating products and services to a broad audience led to new customer relationships, sales, and market hence market access.
- Feedback from a diverse range of stakeholders helped refine products, identify market fit, and validate the viability of innovations.
- Showcasing events served as a platform for policymakers and government agencies to engage with the innovation community. This interaction led to the development of supportive policies, and infrastructure improvements that benefited the entire ecosystem.
- Successful startups and innovative projects showcased at exhibitions served as role models and sources of inspiration for others within the ecosystem.
- The showcasing events provided a platform for innovators to connect, collaborate, and celebrate each other's achievements, fostering a supportive and cohesive ecosystem culture.

- Regularly hosting showcasing and exhibition events allowed COSTECH and other ecosystem stakeholders to monitor the ecosystem's progress over time. Measuring key performance indicators, such as the number of participants, innovations showcased, investments attracted, and collaborations formed provided insights into ecosystem growth and development and tracked progress over time.
- Showcasing events put a spotlight on innovative products, services, and technologies. This recognition boosted the visibility of start-ups and innovative projects, attracting potential customers, partners, and investors.

However, to maximize the impact of showcasing and exhibitions in building an innovation ecosystem, COSTECH or any other organizers should ensure that these events are well-structured, inclusive, engaging events that facilitate meaningful interactions among stakeholders and are aligned with the ecosystem's goals and objectives. They should also consider the long-term sustainability of such events and their role in nurturing a vibrant and thriving innovation.

11. Recommendations

Based on the various components presented in Parts I, II and III concerning the development of Tanzania's innovation ecosystems the following recommendations are offered to the identified collaborating actors.

Recommendations to

Policymakers at the Governmental level

- appreciate the role of COSTECH as a national driver for the development of Tanzanian innovation ecosystems.
- confirm the authority for COSTECH to be that driver.

LGAs

- mainstream the cluster model in the district development plans
- continue building capacities and competencies for innovation processes
- advocate the use of the 5 guidelines.

COSTECH

- acknowledge your coordination role for the innovation ecosystems in Tanzania
- acknowledge your coordination role in all your innovation interventions
- advocate the use of the 5 guidelines.

SIDO

- continue to support the innovative clusters
- acknowledge the importance of collaboration between SIDO national and regional levels
- advocating the use of the 5 guidelines

Innovative clusters

- keep on developing, continue to build trust, and show results
- work on the conditions listed in CRIM
- embrace the guidelines for the endeavours
- advocate the use of the 5 guidelines

Other innovative platforms like hubs, FDCs

- continue your catalyst role for collaboration and building an innovation culture within the organization
- advocating the use of the 5 guidelines

Universities and R&D institutions

- make the focal person's position sustainable
- operationalize and advocate the use of the 5 guidelines
- acknowledge the unique contribution of the innovation hubs and clusters in the innovation ecosystems

Sida

- distribute this handbook at all relevant bodies of Sida and in any Sida-related innovation context abroad.
- advocate the use of the 5 guidelines
- recognize and support the unique contribution of the innovation hubs and clusters in the Tanzanian innovation ecosystems

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Last but not least, we express our appreciation to all those who have championed the cause of sustainable innovation and continue to work tirelessly to address pressing global challenges. Your passion, dedication, and vision are the driving force behind the transformative changes needed to create a more sustainable and equitable world.

To our readers, we hope this handbook serves as a valuable resource and source of inspiration on your journey toward sustainable innovation. May it empower you to make positive changes in your communities and organizations and contribute to a more sustainable future for all.

Thank you to everyone who has been a part of this endeavour. Your collective efforts have turned the vision of a Handbook on Sustainable Innovation into a reality.

Dr Gerald Kafuku,
Director CDTT,
COSTECH

APPENDIX

The complete, detailed guidelines are given at the following link of innovative Cluster initiatives at COSTECH *(clusters.costech.or.tz).*


COSTECH


Sida
SWEDISH INTERNATIONAL
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SID