

## STAKEHOLDERS DYNAMICS IN THE GRASSROOTS INNOVATION JOURNEY IN TANZANIA: A SWOT ANALYSIS

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### Abstract

The study analyzes the roles of various stakeholders in Tanzania's grassroots innovation journey using a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. The study examines key actors, including government agencies, private sector organizations, non-governmental organizations (NGOs), international donors and grassroots innovators to assess their impact on the innovation ecosystem. A cross-sectional design was employed to collect qualitative data from 35 grassroots innovators, selected through purposive sampling from sources such as the Tanzania Commission for Science and Technology (COSTECH) database, Mashindano ya Kitaifa ya Sayansi, Teknolojia na Ubunifu (MAKISATU) records, and participants in the Dar es Salaam International Trade Fair Exhibition (SABASABA). Data were gathered through semi-structured questionnaires, key informant interviews and observations. The SWOT analysis reveals that stakeholders such as the Ministry of Education, Science and Technology (MOEST) and COSTECH provide crucial policy and funding support but face challenges like bureaucratic delays and budget constraints. Other institutions, including the Vocational Education and Training Authority (VETA), Small Industries Development Organization (SIDO), National Institute of Transport (NIT) and Dar es Salaam Institute of Technology (DIT) are recognized for their role in incubating grassroots innovations. The private sector and international donors contribute financial and technical support, yet issues related to trust and alignment with grassroots needs hinder their effectiveness. The findings emphasize the need for enhanced collaboration, improved coordination and streamlined administrative processes to strengthen stakeholder involvement in grassroots innovation.

**Keywords:** Grassroots Innovation, Stakeholder Analysis, SWOT Analysis, Innovation Ecosystem, Tanzania.

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## **Introduction**

Grassroots innovation plays a crucial role in addressing socio-economic challenges in Tanzania, particularly in sectors such as agriculture, health, and education, where local solutions are essential (Mdemu, 2023). Unlike mainstream technological advancements, grassroots innovations emerge from necessity, driven by individuals and communities seeking practical solutions to local problems (Wang *et al.*, 2021). However, the success and sustainability of grassroots innovations depend significantly on the roles and interactions of various stakeholders within the innovation ecosystem.

The grassroots innovation ecosystem in Tanzania comprises multiple stakeholders, including government agencies, private sector actors, non-governmental organizations (NGOs) and international donors. Each stakeholder brings unique strengths, weaknesses, opportunities and threats that shape the innovation journey. For example, the Ministry of Education, Science and Technology (MOEST) and the Tanzania Commission for Science and Technology (COSTECH) are instrumental in providing policy frameworks and funding support, yet they face challenges such as bureaucratic inefficiencies and budget constraints (Miller and Verhoeven, 2022). Similarly, while the private sector and international donors contribute financial and technical assistance, issues related to trust and alignment with grassroots needs remain significant barriers (Owen and Tidd, 2023).

Despite the growing interest in innovation systems, research on the SWOT attributes of stakeholders in grassroots innovation remains limited. Prior studies have largely focused on large-scale technological innovations, overlooking the complexities of grassroots innovation dynamics in Tanzania (Bessant and Tidd, 2022; Martin and Salgado, 2022). This study aims to fill this gap by conducting a comprehensive SWOT analysis to examine how stakeholders influence grassroots innovation. By identifying their strengths, weaknesses, opportunities and threats, the study provides insights into improving stakeholder's collaboration and fostering a more effective support system for grassroots innovators.

## **Methodology**

This study employed a qualitative research approach to investigate the roles of stakeholders within Tanzania's grassroots innovation ecosystem. A cross sectional design was adopted, enabling data to be collected at a single point in time. This design was particularly useful for capturing the diverse dynamics of stakeholders involved in the innovation ecosystem. It provided in-depth, context-specific insights into how stakeholders interact and influence grassroots innovations. Data collection took place from July 2023 to April 2024.

The study focused on 35 grassroots innovators who were purposively selected from various sources. These included 16 innovators from the COSTECH Innovators Database, 11 innovators from the MAKISATU databases for the years 2020, 2021, and 2022 and 8 participants from the 45<sup>th</sup> and 46<sup>th</sup> Dar es Salaam International Trade Fair Exhibitions (SABASABA) held in 2021 and 2022. The innovators represented various sectors such as agriculture, ICT, environment, energy, engineering, education, health, security, transport, industrial and water.

Among the selected innovators, 19 were at the "realizing" stage of the innovation journey and had participated in exhibitions. Of these, 8 attended the 2023 SABASABA Exhibition in Dar es Salaam, while 11 participated in the 2023 NANENANE Exhibitions held in different regions, including Arusha, Morogoro and Mbeya. Semi-structured questionnaires were used to engage these innovators and gather information on the roles of stakeholders within the grassroots innovation ecosystem. For innovators who had not reached the "realizing" stage and did not participate in the exhibitions, in-depth phone interviews were conducted using semi-structured questionnaires. These interviews focused on identifying barriers and successes in their progress along their innovation journey. The selection criteria ensured diversity by including innovators at various stages of their innovation journeys as documented in the databases.

**Table 1: Summary of Sample Size Composition by Sectors, Stages and Exhibitions**

Sector	Innovation Journey Stages and non Attendees of 2023 NANENANE and SABASABA Exhibition					NANENANE 2023 Exhibition Attendees			SABASABA 2023 Exhibition Attendees
	Ideation	Exploring	Committing	Realizing	Optimizing	NANENANE	NANENANE	NANENANE	
						Arusha Exhibition Attendees	Morogoro Exhibition Attendees	Mbeya Exhibition Attendees	
Agriculture					1	3	2	6	
ICT	2	1			2				4
Environment	1								
Education			1		1				2
Health	1		1						
Industrial									
Security			1						
Transport									
Water									2
Energy			1						
Engineering	1	1	1						
TOTAL	5	2	5		4	3	2	6	8
TOTAL SAMPLE SIZE						35			

**Source:** COSTECH. (2023). *Database of grassroots innovators in Tanzania*. Tanzania Commission for Science and Technology.

Data collection involved three main methods. First, semi-structured questionnaires were used to engage innovators during national exhibitions, including the 2023 NANENANE and SABASABA exhibitions. This exhibition-based engagement provided a natural setting for collecting qualitative data and ensured broader representation, as exhibitions are known to be effective platforms for engaging a diverse range of innovators (Krugman, 2021; Chirchir, 2020).

## **Ethical Considerations**

The study adhered to ethical research principles to ensure participant safety, privacy and informed consent. The following ethical measures were implemented:

**Informed Consent:** Participants were fully informed about the study's purpose, procedures, and potential risks before participation. Written consent was obtained prior to data collection in the questionnaire and checklist of key informant introduction.

**Consent Documentation:** For phone interview participants, verbal consent was obtained and documented accordingly.

**Confidentiality:** Participants' identities and responses were anonymized to maintain confidentiality and protect sensitive information.

**Ethical Approval:** The study received approval from the **Sokoine University of Agriculture (SUA) Research Ethics Committee (SUA/ADM/R.1/8/1033)** ensuring compliance with research ethics standards, including voluntary participation and the right to withdraw without consequences.

Additionally, key informant interviews were conducted with government officials, private sector representatives, and NGOs, focusing on stakeholders involved in policy formulation, funding, incubation and technical support for grassroots innovation. These interviews were essential for understanding the roles these stakeholders play in supporting grassroots innovators and for gathering qualitative depth and contextual insights. Finally, observational checklists were used to document prototypes and innovations at different stages of development during the exhibitions, which enriched the qualitative data with visual and contextual understanding.

The data were analyzed using a SWOT (Strengths, Weaknesses, Opportunities and Threats) framework, which guided the systematic analysis of stakeholders' roles and interactions within the grassroots innovation ecosystem. The SWOT analysis categorized the roles of stakeholders and highlighted strengths, weaknesses, opportunities, and threats within the ecosystem. Strengths were identified as supportive roles and positive contributions by stakeholders, while weaknesses pointed to systemic and organizational challenges. Opportunities identified areas for collaboration and improvement, and threats outlined external and internal risks to the sustainability of grassroots innovations.

## **Results**

### **SWOT Results for Different Innovation System Stakeholder's**

The SWOT analysis summarized in Table 2 provides insights into the strengths, weaknesses, opportunities and threats for each innovation system stakeholder, facilitating a better understanding of their roles, challenges, and potential impacts on the grassroots innovation journey.

### **Grassroots Innovators**

Grassroots innovators possess a strong understanding of local issues and exhibit high levels of creativity and resourcefulness. However, they face significant weaknesses, including limited access to financial resources, technical expertise and market linkages. Opportunities are abundant,

particularly in the form of support from various stakeholders and the global emphasis on sustainability. Despite these opportunities, threats such as bureaucratic hurdles, strict regulations, competition from established players and the risk of idea theft or mishandling by dishonest professionals remain significant challenges.

### **Ministry of Education, Science and Technology (MOEST)**

MOEST's strengths lie in its authoritative position and its ability to influence the review of the STI national policy, allocate resources and link innovators to COSTECH for support. However, bureaucratic inefficiencies and delays, particularly in policy review can hinder timely support and negatively impact the grassroots innovation journey. MOEST has opportunities to foster collaborations and position Tanzania as a hub for innovation, while also intervening when there are delays in innovation support from COSTECH. However, threats such as political instability, changes in government priorities and the rapidly evolving technological landscape can severely affect grassroots innovation outcomes.

### **Tanzania Commission for Science and Technology (COSTECH)**

COSTECH is strong in providing comprehensive support including technical, financial and linkage support, offering opportunities for exhibitions and mentorship through BUNI hub. However, limited resources, low budgets for Science, Technological and Innovation (STI) issues and bureaucratic delays particularly in fund disbursement and documentation pose significant challenges. Opportunities exist in increasing collaborations and positioning Tanzania as an innovation leader. The centralized location of BUNI hub and Dar Teknohama Business Incubator (DTBi) in Dar es Salaam, along with budget constraints, presents threats to accessibility for grassroots innovators outside Dar es Salaam region.

### **Tanzania Private Sector Foundation (TPSF)**

TPSF's strengths include resource mobilization, extensive networks and supporting grassroots innovators through COSTECH providing a platform for commercialization. However, aligning private sector interests with grassroots innovators goals can be challenging and delays in implementation have been significant. Opportunities for TPSF include leveraging public-private partnerships and digital platforms to link grassroots innovators with private sector entities. Economic fluctuations, regulatory changes and continued implementation delays are major threats to the support of grassroots innovations and commercialization process.

### **Business Registration and Licensing Agency (BRELA)**

BRELA's strengths include specialized knowledge in intellectual property law and helping grassroots innovators with patent documentation to protect their innovations. However, bureaucratic inefficiencies and the complexity of patent procedures are significant weaknesses. Opportunities for BRELA include enhancing services and expanding outreach to better safeguard

grassroots innovations. Changes in patent laws, funding limitations and competition from similar organizations are ongoing threats.

### **Copyright Society of Tanzania (COSOTA)**

COSOTA's strengths lie in its legal expertise, protection of intellectual property and supporting innovators with copyright issues. However, many grassroots innovators are unaware of COSOTA's functions and bureaucratic delays hinder timely support. Opportunities include expanding services and increasing collaboration. The lack of awareness and confusion between COSOTA and BRELA intensifies the risk of idea theft, while regulatory changes and funding challenges are notable threats.

### **Vocational Education and Training Authority (VETA)**

VETA has established infrastructure and technical support for grassroots innovators including hosting support. However, resource limitations and issues with host expertise, along with poor cooperation and delays in fund disbursement hinder effectiveness of the grassroots innovation journey. Opportunities for VETA include aligning with development goals and organizing grassroots innovations. However, competition from private institutions, economic shifts and inadequate host expertise are threats that can hinder the timely completion of grassroots innovation journey.

### **Small Industries Development Organization (SIDO)**

SIDO's strengths include its extensive experience and infrastructure, providing technical and hosting support for grassroots innovators. However, like VETA, SIDO faces resource limitations, bureaucratic inefficiencies and challenges with host expertise. Opportunities include access to national and international funding and sustainable development innovations. Threats include competition, economic instability and the need for constant adaptation, with delays and inadequate host expertise posing significant risks to the grassroots innovation success.

### **Dares Salaam Institute of Technology (DIT)**

DIT's strengths are its robust infrastructure and expertise in technology and education, providing essential technical and hosting support. However, funding limitations, bureaucratic hurdles and issues with host expertise remain weaknesses. Opportunities for DIT include leading innovative innovations and aligning with development goals. Threats involve competition, rapid technological changes and the risks associated with delayed innovations due to bureaucratic inefficiencies.

### **National Institute of Transport (NIT)**

NIT's specialized expertise and infrastructure provide strong support for grassroots innovators, particularly in technical and hosting areas. However, funding limitations and bureaucratic inefficiencies are weaknesses that need addressing. Opportunities exist in smart transportation

systems and sustainable mobility solutions, with NIT's grassroots innovation centers being beneficial. However, competition, economic fluctuations, the challenges of inadequate host expertise and delays in fund disbursement remain significant threats.

### **Business and Financial Services**

The strengths of business and financial services lie in their ability to mobilize financial resources and offer expertise to grassroots innovators. However, tough eligibility criteria, bureaucratic processes and a lack of trust in grassroots innovators pose significant challenges. Opportunities include impact investing and digital financial platforms, facilitated by projects like IMBEGU from CRDB Bank. Threats include economic depressions, regulatory challenges and strict conditions that hinder access to funding for grassroots innovators.

### **Lawyers**

Lawyers bring essential legal expertise and regulatory guidance particularly in contracts, patents and copyright issues. However, the high cost of legal services and the complexities involved in contract signing before fund disbursement are challenges. Opportunities for lawyers include expanding IP protection services and adopting legal tech solutions. Threats include economic instability, competition from online legal resources and rapid changes in IP law that could complicate the grassroots innovation journey.

### **Researchers**

Researchers contribute valuable expertise and access to pioneering technologies to grassroots innovation. However, the disconnect between research and practical application, along with divided care due to other commitments poses challenges. Opportunities include interdisciplinary collaboration and increased funding provided researchers fully commit to the grassroots innovation journey. Threats involve political or economic instability, community resistance and the impact of researchers' divided focus on the success of grassroots innovation.

### **Customers**

Customers play a crucial role as the buyers of grassroots innovators' products and services. Their growing interest in sustainable products is a strength, though limited awareness and trust in locally made products are weaknesses. Opportunities include leveraging digital platforms and effective marketing to shift perceptions. However, threats like competition from established brands, economic instability and the importation of foreign products can diminish the market for grassroots innovations.

### **Public**

The public benefits from government policies ensuring access to a wide range of innovation products, which boosts consumer satisfaction. However, restrictive policies, low trust in locally made products and economic downturns are significant weaknesses. Opportunities include policies

promoting grassroots innovations and increasing digital literacy, which can engage more consumers. Threats include policy changes, economic crises, cultural resistance and the digital gap, all of which can impact the market for locally innovated products.

### **Partners**

Partners, including international donors provide technical, financial and linkage support to grassroots innovators. Their strengths include strong government support, financial resources and access to advanced technology. However, reliance on government policies, economic instability and cultural resistance pose risks. Opportunities exist in increasing government incentives, economic recovery and emerging markets while threats include geopolitical tensions, rapid technological changes and regulatory challenges that could hinder operations and investments on grassroots innovations projects.

### **Suppliers/ Brokers**

Suppliers and brokers benefit from favorable trade regulations and economic stability, which ensure consistent supply and reasonable costs. However, tough regulations, economic fluctuations and high costs of sustainable materials pose challenges. Opportunities include new trade agreements, economic growth and technological advancements. Threats involve trade wars, economic downturns and regulatory changes that could disrupt supply chains and operations.

**Table 2: SWOT Results for Different Innovation System Stakeholder’s**

<b>Stakeholder</b>	<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>
<b>Grassroots Innovators</b>	Understanding of local issues, creativity and resourcefulness	Limited access to financial resources, technical expertise and market linkages	Support from stakeholders and global emphasis on sustainability	Bureaucratic hurdles, stringent regulations, competition and idea theft
<b>MOEST</b>	Authoritative position, policy influence and resource allocation	Bureaucratic inefficiencies and delays in policy review	Fostering collaborations and positioning Tanzania as a hub for innovation	Political instability, changes in government priorities and evolving technology
<b>COSTECH</b>	Comprehensive support system, exhibition and mentorship opportunities	Limited resources, bureaucratic delays and low budgets	Increased collaboration and positioning Tanzania as an innovation leader	Political climate changes, funding issues, competition and centralized location
<b>TPSF</b>	Resource mobilization, extensive networks and commercialization platform	Challenges aligning private sector interests with grassroots innovators goals	Public-private partnerships and leveraging digital platforms	Economic fluctuations, regulatory changes, competition and delays in implementation
<b>BRELA</b>	Specialized knowledge in IP law and patent documentation support	Bureaucratic inefficiencies and complexity of	Enhancing services, expanding outreach and	Changes in patent laws, funding limitations and competition

		patent procedures	safeguarding innovations	
<b>COSOTA</b>	Legal expertise, IP protection and copyright support	Lack of awareness among grassroots innovators and bureaucratic delays	Expanding services, increasing collaboration and raising awareness	Regulatory changes, competition, lack of awareness and funding challenges
<b>VETA</b>	Established infrastructure, technical support and hosting support	Resource limitations, inadequate commitment from host expertise and delays in fund disbursement	Aligning with development goals and organizing innovative projects	Competition from private institutions, economic shifts and inadequate host expertise
<b>SIDO</b>	Extensive experience, infrastructure and technical support	Resource limitations, bureaucratic inefficiencies and inadequate support from host expertise	National and international funding and organization of sustainable development innovation projects	Competition, economic instability, delays in fund disbursement and inadequate host expertise
<b>DIT</b>	Infrastructure and expertise in technology and education	Funding limitations, bureaucratic hurdles and inadequate host expertise	Leading innovative projects and aligning with development goals	Competition, rapid technological changes and bureaucratic inefficiencies
<b>NIT</b>	Specialized expertise, infrastructure and technical support	Funding limitations, bureaucratic inefficiencies and inadequate host expertise	Smart transportation systems and sustainable mobility solutions	Competition, economic fluctuations, technological changes and funding delays

<b>Business &amp; Financial Services</b>	Mobilization of financial resources and financial expertise	Stringent eligibility criteria, bureaucratic processes and lack of trust to GI	Impact investing and digital financial platforms	Economic downturns, regulatory challenges and strict conditions to grassroots innovations
<b>Lawyers</b>	Legal expertise, regulatory guidance and technical support	High cost of legal services and complications in contract signing	Expanding IP protection services and legal tech solutions	Economic instability, competition from online resources and changes in IP law
<b>Researchers</b>	Expertise and access to innovative technologies	Disconnect between research and practical application and separated focus	Interdisciplinary collaboration and increased funding	Political/economic instability, community resistance and busy schedules
<b>Customers</b>	Interest in sustainable products	Limited awareness and trust in locally made products	Leveraging digital platforms, effective marketing perceptions and boost demand	Competition from established brands, economic instability and importation of foreign products
<b>Public</b>	Access to a wide range of products and high purchasing power	Restrictive policies, low trust in local products and economic downturns	Policies promoting innovation and increasing digital literacy	Policy changes, economic crises, cultural resistance and digital divide
<b>Partners</b>	Strong government support, financial resources and technology access	Reliance on government policies, economic instability	Increasing government incentives, economic recovery and	Geopolitical tensions, financial crises, cultural barriers and regulatory changes

		and cultural resistance	emerging markets	
<b>Suppliers/Brokers</b>	Favorable trade regulations, economic stability and technological advancements	Stringent regulations, economic fluctuations and high costs of sustainable materials	New trade agreements, economic growth and technological advancements	Trade wars, economic downturns, technological failures and regulatory changes

## Discussion

### SWOT Discussion's for Different Innovation Stakeholder's Grassroots Innovators (GI)

GI in Tanzania demonstrate a profound ability to identify and address local challenges, enabling them to develop solutions tailored to their communities. Their deep connection to local contexts facilitates innovations that are both relevant and impactful, even in resource constrained environments. Smith *et al.* (2021) highlight the critical role of leveraging local knowledge and materials in fostering innovation under such conditions.

Despite these strengths, GI face substantial obstacles. Limited access to financial resources and technical expertise impedes the development and scaling of their innovations. A lack of market linkages further restricts their ability to reach broader audiences. These challenges are exacerbated by inadequate infrastructure and institutional support, as emphasized by Oelofsen *et al.* (2020), who advocate for collaborations with trustworthy professionals to transform ideas into prototypes. Without these collaborations, grassroots innovators risk stagnation and exploitation.

Opportunities for grassroots innovators are emerging through the support of stakeholders such as government agencies, NGOs, academic institutions and the private sector. These entities can help overcome financial and technical barriers while facilitating market access. Keane *et al.* (2021) underscore the importance of strong professional networks in advancing grassroots innovation, providing expertise and resources to mitigate existing challenges. Additionally, the global focus on sustainability aligns with grassroots innovation goals, opening avenues for funding, collaboration and recognition.

### Ministry of Education, Science and Technology (MOEST)

MOEST plays a critical role in fostering innovation in Tanzania by linking grassroots innovators to key support structures such as COSTECH. This sentiment was echoed by multiple key informants. As one senior official from MOEST highlighted:

*"...The ministry has the capacity to support innovation, but the bureaucratic hurdles often prevent us from acting quickly enough..." (Key informant, MoEST, 19<sup>th</sup> July 2023).* This aligns with

the findings of Mwamila and Swai (2019), who emphasized the importance of government involvement in creating a conducive environment for innovation.

However, the research uncovered significant bureaucratic inefficiencies that hinder the timely support of grassroots innovators. One key informant from MOEST expressed their frustration, saying:

*"...We have had to wait months for approvals on funding and resource allocation from higher government authorities and donor agencies, which greatly hinders our ability to support innovators at the pace required by the market..." (Key informant, MoEST, 19<sup>th</sup> July 2023).* This delay in resource allocation and approval processes is consistent with the World Bank's (2021) assertion that such inefficiencies serve as barriers to adaptive policy responses, particularly in fast evolving technological fields.

Despite these challenges, the study underscores MOEST's vital role in the innovation ecosystem, noting that grassroots innovators would struggle to scale their innovations without the ministry's support. This echoes Mazzucato's (2018) emphasis on the necessity of government intervention in fostering innovation. However, the research also found that MOEST's role is complicated by competing priorities within the ministry. As one respondent from the private sector pointed out:

*"...MOEST is often caught between education, technology and other priorities, which makes it difficult to maintain a steady focus on grassroots innovators..." (Key informant, TPSF, 17<sup>th</sup> July 2023).* This observation highlights the challenge of balancing various sectors and goals within a single ministry, which detracts from the ministry's capacity to fully focus on innovation and the needs of grassroots innovators.

The challenges facing MOEST are further exacerbated by political instability. One key informant from MOEST shared their concern, stating:

*"...Every time the government changes, innovation initiatives suffer because we must realign to new priorities..." (Key informant, MoEST, 19<sup>th</sup> July 2023).* This sentiment aligns with Mwamila and Swai's (2019) assertion that political instability can undermine ongoing innovation programs, leading to disruptions and delays in the implementation of crucial support mechanisms for innovators.

Nevertheless, the study also identifies opportunities for MOEST to overcome these challenges, particularly through international collaboration. As an interviewee from an international organization participating in the FUNGUO program stated:

*"...If MOEST and COSTECH can navigate the political landscape and strengthen partnerships with global players, it could drive significant*

*advancements in grassroots innovation..." (Key informant, FUNGUO, 17<sup>th</sup> July 2023). This insight underscores the potential for MOEST to leverage international partnerships, enhancing the capacity for grassroots innovators to access global funding and resources.*

### **Tanzania Commission for Science and Technology (COSTECH)**

COSTECH plays a critical role in advancing innovation in Tanzania by providing technical expertise, financial assistance, and linkages for grassroots innovators. Its infrastructure, alongside partnerships with hubs like BUNI, is essential for transitioning innovative ideas from conception to commercialization (Mugisha *et al.*, 2022). As one key informant from COSTECH highlighted,

*"...COSTECH's infrastructure is vital for scaling innovations..." (Key informant, COSTECH, 12<sup>th</sup> July 2023). This emphasizes the critical support provided by the institution, particularly in overcoming challenges faced by grassroots innovators.*

Despite its strengths, COSTECH's effectiveness is hindered by systemic weaknesses. Bureaucratic inefficiencies and resource constraints have been noted as key challenges. One informant elaborated on the delays in resource allocation, stating:

*"...The approval process is slow, and sometimes it takes months before funding reaches the innovators, which delays their progress..." (Key informant, COSTECH, 12<sup>th</sup> July 2023). This delay in support is consistent with Bianchi and Cagno's (2020) study, which identifies slow processes and limited resources as major barriers to innovation. Such inefficiencies restrict access to critical resources, stifling the pace of innovation.*

Opportunities for COSTECH lie in strengthening global partnerships and fostering collaborations with international research bodies and private sector entities. These initiatives would not only enhance resource availability but also improve the technical expertise needed for grassroots innovators to succeed. One key informant noted the potential for COSTECH to enhance its global positioning, stating:

*"...To become a leader in grassroots innovation, COSTECH must establish stronger ties with international networks and attract global investment..." (Key informant, COSTECH, 12<sup>th</sup> July 2023). This aligns with Visser and Cohen's (2019) emphasis on the importance of incubators and accelerators, and positions COSTECH well to leverage global trends in technology and innovation for economic growth and diversification.*

However, despite these opportunities, COSTECH faces significant threats. Shifts in government priorities and political instability can disrupt funding mechanisms critical to its operations. As one informant from the FUNGUO program expressed:

*"...Political instability and shifting government priorities often threaten our funding, and this hampers our capacity to support innovators..." (Key informant, FUNGUO, 17<sup>th</sup> July 2023).* This highlights the risks associated with the changing political landscape and its impact on funding for innovation. O'Reilly *et al.* (2019) similarly underscore the challenges posed by centralized support structures and regional disparities, particularly for innovators in rural areas with limited access to resources.

Despite these challenges, COSTECH benefits from strong governmental support, enabling it to influence Science, Technology and Innovation (STI) policies and foster an enabling environment for innovation. Collaborations with organizations such as SIDA, NORAD, and UNESCO further bolster its capacity. As one key informant from COSTECH noted:

*"...Our collaboration with international partners strengthens our ability to provide targeted support to innovators, particularly those focused on ICT..." (Key informant, COSTECH, 12<sup>th</sup> July 2023).* Initiatives like innovation hubs and national innovation week position COSTECH to prepare innovators for the Fourth Industrial Revolution, advancing key sectors like ICT.

Weaknesses in STI policies remain, however stakeholders suggested that the current framework needs revision to keep pace with rapid technological advancements. Resource limitations also continue to constrain COSTECH's ability to fully support grassroots innovators. One key informant observed:

*"...The policy framework must be more dynamic to accommodate the fast pace of technological change. Without this, we risk falling behind in supporting our innovators..." (Key informant, COSTECH, 12<sup>th</sup> July 2023).*

Furthermore, global competition for funding and partnerships poses another challenge. The same key informant from the FUNGUO program stressed:

*"...COSTECH must enhance its visibility and appeal to attract international investors, or we will struggle to secure necessary resources for our programs..." ( Key informant ,FUNGUO, 17<sup>th</sup> July 2023).* This reinforces the need for COSTECH to improve its international visibility to secure the resources required to support grassroots innovators.

### **Tanzania Private Sector Foundation (TPSF)**

TPSF plays an instrumental role in supporting grassroots innovation in Tanzania by mobilizing resources and leveraging its extensive private sector networks. Key informants highlighted the importance of TPSF's financial support and linkages, which provide grassroots innovators with the essential tools to scale their ideas into market-ready ventures. One key informant noted:

*"TPSF's network and financial assistance are crucial for innovators to access markets and resources, allowing them to grow their ventures beyond the conceptual stage..." (Key informant, TPSF, 17<sup>th</sup> July 2023).* This support is further underscored by partnerships with organizations such as COSTECH ensure innovators receive both technical and financial assistance. Elston and McKeown (2022) affirm that private sector connections, such as those facilitated by TPSF, are vital for fostering the commercialization of grassroots innovations, highlighting TPSF's significant role in Tanzania's innovation ecosystem.

TPSF's ability to provide market access through its private sector networks is another key strength. According to TPSF informant, such connections are invaluable for expanding the reach and impact of grassroots innovations:

*"Through TPSF, grassroots innovators gain access to an extensive network of private investors, which is essential for scaling their innovations..." (Key informant, TPSF, 17<sup>th</sup> July 2023).* These market connections are pivotal in ensuring that innovative solutions reach a wider audience and gain the traction needed for grassroots innovations success.

However, conflicts occasionally arise between private investors' profit-driven priorities and the social or environmental goals of grassroots innovators. TPSF key informant explained:

*"Private investors often focus on short term financial gains, which can clash with the long term, socially driven goals of grassroots innovators. This mismatch can delay progress..." (Key informant, TPSF, 17<sup>th</sup> July 2023).* This tension reflects broader challenges in public private partnerships, as identified by the OECD (2020), where misalignment of objectives can hinder collaboration and slow the scalability of innovation.

Resource constraints also limit TPSF's ability to support all deserving innovators. TPSF key informant mentioned that the high demand for TPSF's services often overwhelms the foundation, leading to delays or missed opportunities for promising innovation projects. The informant remarked:

*"We simply do not have the resources to support every innovator who approaches us, and some promising ideas do not get the attention they deserve because of this limitation..." (Key informant, TPSF, 17<sup>th</sup> July 2023).* This insight is consistent with Brem *et al.* (2021), who highlight resource limitations and bureaucratic inefficiencies as significant challenges within innovation ecosystems, underscoring the broader difficulties TPSF faces in its operations.

Despite these challenges, TPSF has significant opportunities to expand its impact, particularly through Public Private Partnerships (PPPs) and international collaborations. Key informants noted that closer ties with global organizations could bring additional resources, technical expertise and market access to grassroots innovators. One informant from a development organization emphasized:

*"International collaborations could unlock new funding opportunities and access to cutting edge technologies, making it easier for grassroots innovators to scale their solutions..." (Key informant, FUNGUO, 17<sup>th</sup> July 2023).* This view aligns with Smith *et al.* (2021), who emphasize the importance of private sector engagement in scaling innovations. The global push for PPPs and innovation provides a favorable environment for TPSF to attract international investments and position Tanzania as a key player in grassroots innovation.

However, TPSF also faces external threats that could undermine its efforts. Economic fluctuations, for example, can lead private sector players to shift their focus toward short term financial stability, leaving fewer resources for innovation initiatives. TPSF informant noted:

*"During economic downturns, investors are less willing to commit to long-term innovation projects. This makes funding for innovation scarce, impacting our ability to support innovators..." (Key informant, TPSF, 17<sup>th</sup> July 2023).* Furthermore, the informants expressed concerns about the impact of policy instability, which can disrupt the supportive environment TPSF currently enjoys. Brem *et al.* (2021) emphasize that policy and funding instability significantly affect the sustainability of innovation ecosystems, adding to the challenges TPSF must navigate. Additionally, increasing competition from other organizations threatens TPSF's influence, potentially limiting its capacity to maintain leadership in supporting grassroots innovation.

### **Business Registration and Licensing Agency (BRELA)**

BRELA plays a pivotal role in Tanzania's innovation ecosystem by providing critical support in Intellectual Property (IP) protection, particularly in securing patents for grassroots innovators. Through its expertise in IP law, BRELA offers the legal safeguards necessary for innovators to advance their projects. BRELA key informant remarked:

*"...BRELA's support in securing patents gives grassroots innovators the confidence to invest in and market their innovations without the fear of intellectual theft." ..."* (Key informant, BRELA, 11<sup>th</sup> August 2023). This perspective aligns with Maskus (2020), who highlights the importance

of IP protection in fostering an enabling environment for innovation. By helping innovators protect their ideas, BRELA contributes significantly to the growth and sustainability of grassroots innovation.

Despite these strengths, BRELA's effectiveness is hindered by significant challenges. Bureaucratic inefficiencies often delay patent approvals, leaving innovations vulnerable to intellectual theft. This challenge is consistent with Kitching (2022), who highlights the detrimental effects of lengthy patenting processes on innovation. Additionally, BRELA faces resource constraints that limit its capacity to meet the growing demand for IP services. A key informant from a regulatory body stated:

*"...While awareness of IP protection is increasing, BRELA lacks the resources to serve all the innovators who need their help..."(Key informant, BRELA, 11<sup>th</sup> August 2023).* This situation leaves many grassroots innovators underserved, potentially stifling their ability to scale their innovations.

Opportunities exist for BRELA to enhance its impact within Tanzania's innovation ecosystem. Adopting digital platforms for patent management was a recurring suggestion among informants. As BRELA respondent put it:

*"...Digitalizing the patenting process would make it faster and more accessible, especially for innovators in remote areas..."(Key informant, BRELA, 11<sup>th</sup> August 2023).* In addition to improving efficiency, such platforms could reduce delays and expand accessibility. Collaborations with international patent organizations could help BRELA leverage technical expertise and resources. This aligns with Helpman (2021), who underscores the transformative potential of robust IP frameworks in fostering innovation. By improving outreach and service delivery, BRELA can significantly expand its role in supporting grassroots innovators.

However, BRELA faces several external threats that could undermine its efforts. Changes in domestic or international patent laws could complicate the protection process, creating uncertainty for innovators. One informant highlighted this concern:

*"...Any shift in patent laws whether local or global could disrupt the processes we rely on for IP protection. ..."(Key informant, BRELA, 11<sup>th</sup> August 2023).* Additionally, inadequate funding remains a significant threat. Without sufficient resources, BRELA may struggle to provide timely support as demand grows. A regulatory expert observed:

*"...The increasing number of innovators means BRELA needs more funding to keep up with demand, but this has not been forthcoming ..."(Key informant, BRELA, 11<sup>th</sup> August 2023).*

Competition from other organizations offering IP protection services could also dilute BRELA's influence, potentially diverting innovators to alternative providers. Romer (2021) highlights the risks associated with inadequate IP protection, reinforcing the urgency for BRELA to address these challenges and maintain its critical position within Tanzania's innovation ecosystem.

### **Copyright Society of Tanzania (COSOTA)**

COSOTA plays a pivotal role in safeguarding intellectual property through copyright protection, which is essential for fostering grassroots innovation. By securing innovators' creative works, COSOTA enables them to focus on development without the fear of intellectual theft. COSOTA key informant emphasized:

*"...COSOTA is fundamental in ensuring innovators copyrights, especially for grassroots innovators who often lack resources to navigate legal processes independently..."* (Key informant, COSOTA, 7<sup>th</sup> August 2023). This observation is consistent with Ginsburg (2020), who underscores that copyright law underpins innovation by securing innovators contributions, reinforcing COSOTA's critical role in Tanzania's innovation ecosystem.

However, COSOTA faces notable challenges that hinder its effectiveness. Bureaucratic inefficiencies, particularly delays in registration, have been identified as a significant issue which leave grassroots ideas vulnerable to theft. This aligns with Chowdhury's (2021) findings, which highlight that protracted copyright registration processes deter innovators from seeking protection.

Additionally, COSOTA's limited resources constrain its ability to meet the increasing demand for services. A regulatory expert observed:

*"...The demand for copyright protection has grown, but COSOTA lacks the resources to scale its operations effectively..."* (Key informant, COSOTA, 7<sup>th</sup> August 2023). This challenge reflects Goldstein's (2020) analysis of IP agencies' operational limitations globally, which underscores the need for adequate resourcing to enhance efficiency.

Opportunities for COSOTA to enhance its impact include embracing technology and fostering international collaboration. Digitalizing copyright registration could streamline operations, reduce delays, and improve transparency. One key informant suggested:

*"...Integrating digital platforms will not only quicken the process but also expand accessibility for grassroots innovators in remote areas..."* (Key informant, COSOTA, 7<sup>th</sup> August 2023). This recommendation aligns with global trends identified by Goldstein (2020), where digital transformation has significantly improved IP service delivery.

Additionally, targeted educational campaigns could address the widespread lack of awareness among innovators about copyright processes. A respondent noted:

*"...Many grassroots innovators do not even know what copyright protection entails or how to access it; education is key to bridging this gap..." (Key informant, COSOTA, 7<sup>th</sup> August 2023).*

COSOTA must also address external threats, including frequent changes in copyright laws and resource inadequacies. These issues exacerbate existing challenges, creating uncertainty among innovators. One informant remarked:

*"...Constant changes in copyright laws confuse creators and make it harder for them to trust the system..." (Key informant, COSOTA, 7<sup>th</sup> August 2023).* Lessig (2021) warns of the implications of weak legal frameworks, emphasizing that unclear or shifting laws can discourage innovators from seeking protection. Additionally, the emergence of alternative IP service provider's increases competition, necessitating that COSOTA enhance its efficiency to remain relevant.

### **Vocational Education and Training Authority (VETA)**

VETA plays a pivotal role in supporting grassroots innovation in Tanzania by offering technical education and practical training. These programs equip innovators with the necessary skills to transform their ideas into viable projects. One key informant highlighted:

*"...VETA is crucial in imparting technical knowledge and practical skills that grassroots innovators need to succeed..." (Key informant, VETA, 20<sup>th</sup> July 2023).* This observation aligns with Hanushek and Woessmann (2020), who emphasize the importance of vocational training in fostering innovation. Through tailored programs, VETA ensures that grassroots innovators acquire technical competencies suited to the demands of evolving markets, thereby strengthening their capacity to innovate and compete.

However, VETA faces several challenges that limit its impact. Limited resources are a primary concern, as noted by a respondent:

*"...VETA often struggles to meet the training demands of all grassroots innovators due to insufficient funding..." (Key informant, VETA, 20<sup>th</sup> July 2023).* This aligns with findings from the International Labour Organization (ILO, 2022), which highlights financial constraints as a global challenge for vocational training programs.

Bureaucratic inefficiencies further exacerbate these limitations. For instance, delays in updating training curricula hinder VETA's ability to align its programs with technological advancements. VETA key informant explained:

*"...The delay in adapting training to reflect new technologies reduces its relevance for today's fast evolving markets..." (Key informant, VETA, 20<sup>th</sup> July 2023).* This challenge resonates with the World Economic Forum's (2020) observations about the risks posed by outdated vocational education programs in the face of rapid technological change.

Despite these challenges, there are significant opportunities for VETA to enhance its influence. Establishing strategic partnerships with international organizations and donors could provide the resources and technical expertise needed to improve training quality. One informant suggested:

*"...Collaboration with international entities could help VETA secure funding and improve its training offerings..." (Key informant, VETA, 20<sup>th</sup> July 2023).*

Furthermore, the increasing global focus on sustainable development and green technologies presents an opportunity for VETA to integrate these themes into its programs. Freeman (2021) underscores the potential of vocational training institutions to address environmental challenges while contributing to economic growth. By incorporating sustainable development goals into its curricula, VETA can increase its relevance and gain recognition both locally and globally.

However, VETA must address external threats to maintain its competitive edge. Competition from private institutions and NGOs offering similar training services poses a significant challenge. A respondent noted:

*"...Private institutions are attracting innovators who might otherwise turn to VETA for training, reducing its influence..." (Key informant, VETA, 20<sup>th</sup> July 2023).*

Economic uncertainties and policy changes also threaten funding availability, potentially limiting VETA's capacity to expand its services. Additionally, the rapid pace of technological advancement necessitates continual updates to training programs, which is a resource-intensive process. These issues align with the World Economic Forum's (2020) assertion that delays in modernizing vocational training can significantly hinder innovation.

### **Small Industries Development Organization (SIDO)**

SIDO plays a pivotal role in Tanzania's innovation ecosystem by supporting small scale industries and grassroots innovators. With its extensive infrastructure and expertise, SIDO provides technical training, funding and access to essential resources that enable innovators to develop and scale their innovations. A key informant remarked:

*"...SIDO is instrumental in fostering small industries by equipping innovators with the skills and resources necessary to succeed..." (Key informant, SIDO, 4<sup>th</sup> August 2023).* This observation is supported by Nichter and Goldmark (2022), who emphasize the critical role of support systems in enabling small and medium sized enterprises (SMEs) to overcome resource limitations and enhance their innovation capacity.

However, SIDO faces several challenges that constrain its effectiveness. Resource limitations are a significant concern, as frequently cited by key informants. He noted:

*"...There are many innovators in need, but SIDO struggles to meet demand due to inadequate funding..." (Key informant, SIDO, 4<sup>th</sup> August 2023).*

Delays in fund disbursement further exacerbate frustrations among innovators. This issue aligns with findings by Kline and Rosenberg (2021), who highlight that inefficiencies in fund allocation can undermine the impact of support systems. Additionally, SIDO's infrastructure struggles to keep pace with rapid technological advancements, which diminishes its ability to provide up to date support. As key informants observed:

*"...Without investment in modern tools and resources, SIDO's support risks becoming obsolete..." (Key informant, SIDO, 4<sup>th</sup> August 2023).* These challenges underline the importance of adaptability and resource mobilization for sustaining SIDO's impact on grassroots innovation.

Opportunities for SIDO lie in aligning its programs with global and national development agendas, particularly the United Nations Sustainable Development Goals (SDGs). Doing so could attract additional funding and foster strategic partnerships, enhancing SIDO's capacity to support grassroots innovators. Key informant suggested:

*"...SIDO has the potential to secure more resources by focusing on sustainable and green innovation initiatives..." (Key informant, SIDO, 4<sup>th</sup> August 2023).* This aligns with Lundvall's (2020) assertion that local innovation centers are pivotal in driving SME led economic growth, especially when their efforts align with global sustainability priorities. Furthermore, the growing recognition of SMEs as key drivers of economic development enhances SIDO's relevance and influence within Tanzania's innovation landscape.

Nonetheless, SIDO must address external threats to maintain its competitive edge. Increasing competition from other organizations offering similar services risks reducing SIDO's influence. A key informant noted:

*"...Emerging competitors attract innovators who might otherwise turn to SIDO..." (Key informant, SIDO, 4<sup>th</sup> August 2023).*

Economic fluctuations and shifting government priorities also pose risks to SIDO's funding stability, while rapid technological changes demand frequent program updates. Nelson (2021) underscores that delays in adapting support mechanisms can suppress innovation, highlighting the importance of proactive updates and relevant expertise. Key informant emphasized: *"...Timely updates and relevant expertise are crucial for retaining innovators and ensuring effective support..." (Key informant, SIDO, 4<sup>th</sup> August 2023).*

### **Dar es Salaam Institute of Technology (DIT)**

DIT plays a pivotal role in fostering grassroots innovation in Tanzania by leveraging its robust infrastructure and technological expertise. Respondents consistently highlighted DIT's contribution to equipping grassroots innovators with the technical skills and knowledge essential for transforming ideas into practical solutions. One key informant noted:

*"...DIT provides an invaluable platform for grassroots innovators to access technical support and training that would otherwise be inaccessible..." (Key informant, DIT, 17<sup>th</sup> July 2023).* This perspective aligns with Benner and Veloso (2020), who argue that technical institutions are critical enablers of innovation by offering necessary resources and expertise.

However, DIT faces significant challenges, primarily related to funding constraints. These limitations hinder its ability to update resources and facilities, reducing its responsiveness to innovators' evolving needs. A DIT key informant said:

*"...Funding is a persistent issue for DIT. We are unable to modernize our facilities or expand our programs as quickly as required..." (Key informant, DIT, 17<sup>th</sup> July 2023).* This challenge echoes Hekkert *et al.* (2021), who describe financial constraints as a major impediment to the effectiveness of innovation support systems.

Another critical challenge is DIT's difficulty in keeping pace with rapid technological advancements. As one informant pointed out:

*"...The pace of technological change is so fast that it's hard for DIT to keep its curriculum and facilities updated..." (Key informant, DIT, 17<sup>th</sup> July 2023).* This observation contradicts Edler and Yeow's (2021) findings, which suggest that technical institutions generally exhibit agility in adapting to technological changes. Addressing this gap would require significant investment in both infrastructure and human capital.

Despite these challenges, DIT has opportunities to enhance its role in grassroots innovation. By aligning its programs with the United Nations Sustainable Development Goals (SDGs), DIT could attract funding and establish strategic partnerships with local and international stakeholders. The key informant suggested:

*"...DIT should explore partnerships with global organizations to secure the resources necessary for expanding its programs and improving its facilities..." (Key informant, DIT, 17<sup>th</sup> July 2023).* This aligns with the growing emphasis on aligning local initiatives with global sustainability goals to foster innovation.

Nevertheless, external threats pose risks to DIT's efforts. Competition from other institutions offering similar services threatens its market position. As the key informant observed:

*"...Other technical institutions are emerging and DIT must innovate to remain competitive..." (Key informant, DIT, 17<sup>th</sup> July 2023).* Furthermore, policy shifts and potential funding cuts could destabilize its operations, while rapid technological changes demand continual updates, adding pressure to already strained resources. Bessant and Tidd (2022) highlight that such competitive and operational pressures can significantly hinder innovation, emphasizing the need for strategic planning and resource mobilization.

### **National Institute of Transport (NIT)**

NIT plays a critical role in fostering grassroots innovation, particularly within the transportation and logistics sectors. NIT's specialized knowledge and infrastructure enable it to offer comprehensive technical support to innovators addressing transportation challenges in Tanzania. One key informant highlighted:

*"...NIT has the technical capacity to provide solutions for local transportation issues, from vehicle design to logistics optimization..." (Key informant, NIT, 17<sup>th</sup> July 2023).* This perspective aligns with Geels (2021), who underscores the importance of technical institutions in driving sector specific innovation.

However, NIT faces significant challenges in fulfilling its mandate. Funding limitations are a persistent issue, restricting the institute's ability to support the growing number of grassroots innovators. A key informant remarked

*"...Our funding does not match the increasing demand for technical support in the transportation sector..." (Key informant, NIT, 17<sup>th</sup> July 2023).* This observation aligns with Chesbrough (2021), who emphasizes how financial constraints can undermine innovation support systems.

Internal bureaucratic inefficiencies also impede NIT's effectiveness. Innovators frequently experience delays in receiving support, which makes frustrating and demotivating. These delays mirror the challenges discussed by Brown and Osborne (2020), who note that bureaucratic hurdles can hinder innovation processes in dynamic sectors.

Moreover, the rapid pace of technological advancements poses a significant challenge. NIT struggles to keep its curricula and technical resources up to date, leaving a gap between industry needs and institutional offerings. The key informant explained:

*"...The transportation sector is evolving so rapidly that NIT is often playing catch up..." (Key informant, NIT, 17<sup>th</sup> July 2023).* This difficulty in maintaining relevance contradicts Tidd and Bessant's (2022) assertion that technical institutions must proactively adapt to technological changes to remain effective.

Despite these challenges, NIT has opportunities to expand its impact. By aligning its initiatives with global transportation and infrastructure goals, the institute can attract additional funding and form strategic partnerships. A key informant suggested:

*"...NIT should explore collaborations with international organizations focused on smart mobility and sustainable transportation..." (Key informant, NIT, 17<sup>th</sup> July 2023).* This aligns with global trends emphasizing sustainability and innovation in the transportation sector.

Nevertheless, NIT faces external threats, including competition from other institutions offering similar support services. The key informant noted:

*"...The competition for limited resources and recognition is intense..." (Key informant, NIT, 17<sup>th</sup> July 2023).* Additionally, economic uncertainties and shifts in government priorities could lead to reduced funding for innovation support. These findings echo the concerns raised by Brown and Osborne (2020), who caution that funding cuts can significantly undermine innovation systems.

### **Business and Financial Services**

Business and financial services are instrumental in supporting grassroots innovation, as they mobilize resources and provide expertise necessary for developing and scaling innovative ideas. These services ensure innovators have access to the capital required to bring their ideas to life while offering financial guidance to navigate complex financial landscapes. A KII respondent from IMBEGU project under CRDB bank and COSTECH stated:

*"...Business and financial services are the backbone for innovators when it comes to financing their innovations. Without access to capital and expert advice, it would be difficult for innovations to scale..." (Key informant, IMBEGU, 12<sup>th</sup> July 2023).* This observation aligns with Gompers and Lerner (2021),

who stress the critical role of financial support in fostering innovation ecosystems.

However, several challenges undermine the effectiveness of business and financial services in supporting grassroots innovators. Stringent eligibility criteria often exclude innovators who lack financial collateral or a proven track record. As the majority of interviewed grassroots innovators responded that, the conditions set by financial institutions often exclude those of grassroots innovators without a proven track record or financial collateral. This leaves many grassroots innovators with great ideas but no means to fund them.

Such barriers, coupled with bureaucratic inefficiencies, delay financial support by COSTECH discourage grassroots innovators. The key informant explained:

*"...The paperwork and waiting time for approval can be discouraging. Many innovators need quick financial support to maintain momentum..." (Key informant, IMBEGU, 12<sup>th</sup> July 2023).* These challenges resonate with Cumming and Johan (2020), who highlight how rigid funding conditions stifle innovation by limiting access to essential resources.

Nevertheless, the evolving financial landscape presents opportunities to enhance the role of business and financial services in supporting grassroots innovation. The increasing focus on impact investing and sustainable finance aligns financial services with innovation initiatives that drive both social and economic growth. IMBEGU key informant noted:

*"...There is a growing shift toward impact investing. Financial institutions are beginning to see that supporting grassroots innovation can drive both social and economic growth..." (Key informant, IMBEGU, 12<sup>th</sup> July 2023).* This trend provides an opportunity for institutions to simplify access to resources, aligning with La Porta *et al.* (2021), who emphasize the need for streamlined financial support to shoot innovation.

Partnerships with government bodies, NGOs, and international organizations also expand funding avenues, enabling financial institutions to reach a broader spectrum of innovators. Additionally, the rise of digital platforms and fintech solutions democratizes access to financial services. As the key informant from COSTECH pointed out:

*"...Digital platforms have made it easier for innovators to secure funding without navigating the complexities of traditional systems..." (Key informant, COSTECH, 12<sup>th</sup> July 2023).* By leveraging these technologies, grassroots innovators can overcome traditional barriers, unlocking new pathways for growth and sustainability.

Despite these promising opportunities, significant threats persist. Economic downturns and financial crises often lead to reduced funding, with financial institutions adopting more conservative lending practices. IMBEGU key informant explained:

*"...When the economy is not performing well, it becomes difficult to find the funding needed to support innovative projects..." (Key informant, IMBEGU, 12<sup>th</sup> July 2023).* Regulatory changes add further complexity, increasing the cost of providing financial support. Additionally, the rise of alternative financing methods, such as crowd funding and peer to peer lending, intensifies competition for traditional financial institutions.

## Lawyers

Lawyers play a critical role in the grassroots innovation ecosystem, offering expertise essential for protecting and commercializing innovative ideas. Their strengths include drafting legally binding contracts, securing patents, protecting copyrights and ensuring regulatory compliance. These functions safeguard the intellectual property (IP) of grassroots innovators, fostering trust and enabling commercialization. BRELA key informant emphasized:

*"...Without legal support, grassroots innovators risk losing ownership of their ideas. Lawyers are crucial in helping grassroots innovators navigate legal complexities and protect our intellectual property..."(Key informant, BRELA, 11<sup>th</sup> August 2023).* This observation aligns with Scholz and Sutton (2020), who highlight the essential role of legal professionals in securing innovators' rights and facilitating commercialization.

Despite these strengths, significant challenges undermine the accessibility of legal services for grassroots innovators, particularly those with limited financial resources. High legal fees often deter innovators from seeking essential protections. As BRELA key informant lamented:

*"...Legal services can be so expensive, especially when innovators are just starting out. Many innovators simply cannot afford them." ..."(Key informant, BRELA, 11<sup>th</sup> August 2023).* The complexity of legal processes further compounds the issue, creating barriers for innovators without a legal background. BRELA key informant remarked:

*"...The legal system can feel like a maze, and without affordable guidance, it's easy to get lost..."(Key informant, BRELA, 11<sup>th</sup> August 2023).* These insights resonate with Harrison and Rainer's (2021) findings, which underscore how high costs and legal delays hinder innovation by restricting access to crucial protections and commercialization opportunities.

Opportunities for lawyers to support grassroots innovation are abundant, particularly as awareness of IP protection continues to grow. Many innovators now recognize that securing IP rights is a prerequisite for scaling their ideas. A key informant observed;

*"...The demand for legal services is growing because innovators are realizing the importance of protecting their intellectual property before they scale their ideas." ...*"(Key informant, BRELA, 11<sup>th</sup> August 2023). Collaborations with NGOs, incubators and innovation hubs can also enable lawyers to offer affordable and tailored legal services, enhancing inclusivity in the innovation ecosystem. Additionally, advancements in legal technology provide transformative potential. Tools like automated contract generators and IP filing platforms simplify legal processes, reduce costs and improve accessibility. These developments align with Gans and Stern's (2020) assertion that effective legal advice not only protects innovators but also facilitates access to funding, thereby fostering growth and sustainability.

Nevertheless, several threats challenge the capacity of legal services to support grassroots innovation effectively. Economic instability often results in reduced funding for legal services, creating a current effect that adversely impacts innovators. As the key informant explained;

*"...When the economy is unstable, it becomes harder to secure funding for legal support. This, in turn, limits innovators' ability to protect their ideas ..."*(Key informant, BRELA, 11<sup>th</sup> August 2023).

The rapid pace of technological advancements and changes in IP law also place pressure on lawyers to remain updated through continuous professional development. Furthermore, the rise of online legal resources and tools poses a competitive threat to traditional legal service models, as cost-effective automated solutions increasingly attract innovators. Zhang and Wang (2021) emphasize that delays and complications in legal processes can significantly impede the innovation journey, highlighting the urgency of timely and accessible legal support to sustain grassroots innovation.

## **Researchers**

Researchers are pivotal to the grassroots innovation ecosystem, leveraging their expertise, access to advanced technologies and evidence based problem solving skills to improve the quality and effectiveness of grassroots innovations. Their ability to bridge scientific knowledge with practical applications enables grassroots innovators to refine their ideas and tackle complex challenges. As the key informant from TEMDO noted:

*"...Researchers are the ones who bring cutting edge knowledge and technology that helps grassroots innovators refine their ideas and make them more effective..."*(Key informant, TEMDO, 2<sup>nd</sup> August 2023). This aligns with Aghion and Howitt (2021), who emphasize that researchers' technical expertise is essential in advancing grassroots initiatives.

Despite their critical role, researchers face notable challenges that can hinder their effectiveness. A major issue is the disconnect between academic research and the practical needs of grassroots innovators. The key informant explained:

*"...There is often a gap between what researchers do in the lab and what grassroots innovators need. Sometimes, the research is too theoretical or not directly applicable..."(Key informant, TEMDO, 2<sup>nd</sup> August 2023).* This observation resonates with Breschi and Lissoni (2021), who highlight that overly theoretical research can limit its practical adoption. Additionally, researchers often encounter difficulties in communicating technical concepts to non-expert stakeholders. As the key informant shared:

*"...Communicating technical details in a way that grassroots innovators can understand is a big challenge for us ..."(Key informant, TEMDO, 2<sup>nd</sup> August 2023).* This communication barrier inhibits collaboration and the integration of research findings into practical solutions. Furthermore, researchers' competing responsibilities and limited engagement with grassroots initiatives further constrain their contributions. Breschi and Lissoni (2021) also note that these factors diminish researchers' capacity to focus on grassroots innovation projects.

Opportunities for researchers to enhance their impact in the ecosystem are considerable. Interdisciplinary collaborations can pool diverse expertise, enabling innovative solutions that address multifaceted challenges. Key informant remarked:

*"...Collaboration across disciplines is a game-changer. When we bring different experts together, we can come up with innovative solutions that would not be possible individually ..."(Key informant, TEMDO, 2<sup>nd</sup> August 2023).* Furthermore, increased funding aligned with national and international development goals presents an opportunity for researchers to prioritize practical and impactful innovations. A respondent emphasized:

*"...With more funding, researchers can focus more on supporting innovators with practical, impactful solutions..."(Key informant, TEMDO, 2<sup>nd</sup> August 2023).* Sustainable Development Goals (SDGs) provide a strategic framework for researchers to lead innovation projects addressing environmental and societal challenges. Zucker and Darby (2021) affirm that when researchers fully commit to these goals, their contributions can significantly strengthen grassroots innovation.

However, researchers must navigate external threats that can disrupt their work in the grassroots innovation ecosystem. Political and economic instability often curtails research funding and hinders the progress of ongoing projects. As key informant remarked:

*"...When there's political instability, funding for research dries up. This disrupts ongoing projects and limits researchers' ability to support innovation ..."* (Key informant, TEMDO, 2<sup>nd</sup> August 2023). Additionally, resistance from communities distrustful of external interventions poses a challenge, particularly when introducing new technologies. This distrust can delay or even block the adoption of innovative practices. Martin and Salgado (2022) highlight how busy schedules and a lack of focus further constrain researchers' capacity to contribute meaningfully, diminishing their effectiveness in supporting grassroots innovation.

### **Customers**

Customers play a vital role in the success of grassroots innovation (GI), serving not only as demand drivers but also as evaluators of innovative products. Their preferences, which increasingly favor unique, locally sourced and sustainable products, align with global trends in sustainability and ethical consumption. One customer interview (KII) respondent highlighted:

*"...Consumers today are increasingly looking for products that have a story behind them, products that are locally sourced and sustainable. This is a huge opportunity for grassroots innovators..."* (Key informant, customer, 8<sup>th</sup> August 2023). Von Hippel (2021) supports this view, emphasizing that customer preferences and feedback significantly shape the success of innovative products.

Despite this growing demand for sustainable products, a key weakness is the limited awareness of GI products among the broader consumer base. Many consumers are unfamiliar with grassroots innovations, which hampers market penetration. As one KII respondent noted:

*"...Many consumers do not know what grassroots innovations are. There is a real challenge in educating them about the value of these products..."* (Key informant, customer, 8<sup>th</sup> August 2023). This finding echoes Rogers (2020), who identified trust issues and limited consumer knowledge as significant barriers to the adoption of local innovations. Additionally, price sensitivity can deter customers, especially if GI products are perceived as more expensive than conventional alternatives. One informant shared:

*"...Price sensitivity is a big issue for customers, especially when grassroots products are more expensive. Consumers often do not see the added value right away..."* (Key informant, customer, 8<sup>th</sup> August 2023).

Nevertheless, significant opportunities exist for engaging customers in the grassroots innovation landscape. Global trends favoring sustainability and ethical consumption provide a fertile ground for expanding GI markets. As a respondent noted:

*"...The trend toward sustainable products is definitely on the rise and grassroots innovators can capitalize on this trend if they position their products well..."* (Key informant, customer, 8<sup>th</sup> August 2023). Leveraging digital platforms and e-commerce can significantly enhance the visibility and accessibility of GI products, thereby broadening the customer base. Another respondent emphasized:

*"... E-commerce and social media are tools that grassroots innovators can use to reach more customers..."* (Key informant, customer, 8<sup>th</sup> August 2023). Marketing strategies that focus on educating customers about the benefits and uniqueness of GI products can also help foster consumer trust and demand. Kotler and Keller (2021) emphasize the role of effective communication in driving innovation adoption, underscoring the importance of marketing in building customer trust.

Despite these opportunities, several threats could undermine customer engagement with GI products. Competition from established brands offering similar products at lower prices remains a critical challenge. A respondent remarked:

*"...Larger brands with more resources often dominate the market, and grassroots innovators struggle to compete, especially on price..."* (Key informant, customer, 8<sup>th</sup> August 2023). This aligns with Porter (2021), who highlights the risks posed by market competition from well established brands. Economic downturns also threaten customer spending power, which can adversely affect demand for premium or position GI products. One informant noted: *"...During economic downturns, people tend to prioritize basic needs over premium products..."* (Key informant, customer, 8<sup>th</sup> August 2023). Additionally, the influx of foreign products at lower prices creates a challenging environment for GI products. As one respondent shared: *"...Foreign products often flood the market at much lower prices, making it hard for local innovators to compete..."* (Key informant, customer, 8<sup>th</sup> August 2023).

## **Public**

The public plays a crucial role in the success of GI by serving as the primary consumers of innovative products and services. A key strength of grassroots innovation is the public's growing

interest in sustainability and locally-produced goods, which fosters a supportive market environment. One Key public interview respondent noted:

*"...The public's growing interest in sustainability and locally made products is a huge boost for grassroots innovators..." (Key informant, public, 7<sup>th</sup> July 2023).* This aligns with Freeman and Soete (2020), who argue that public demand is a significant driver of innovation success and scalability. Public feedback is also essential in enhancing the relevance of GI products, ensuring that they align with consumer needs and preferences.

However, a notable weakness is the limited public awareness of GI products, which hinders their market penetration. As one public respondent shared:

*"...People just do not know enough about grassroots innovations. There is a need for more awareness to help people understand what makes these products unique and valuable..." (Key informant, public, 7<sup>th</sup> July 2023).* This challenge is consistent with Akerlof and Shiller (2021), who discuss the difficulty of building consumer trust in local products. Price sensitivity further complicates this issue, particularly when GI products are perceived as more expensive due to the cost of imported materials. One public informant observed:

*"...When grassroots innovations cost more than cheaper, mass-produced goods, it is a tough sell, especially in markets where affordability is a priority..." (Key informant, public, 7<sup>th</sup> July 2023).*

Despite these challenges, substantial opportunities exist for engaging the public in the GI ecosystem. Global trends favoring sustainability and ethical consumption create a fertile ground for expanding the market for GI products. As the public informant emphasized:

*"...The rise of ethical consumption is an opportunity for grassroots innovators..." (Key informant, public, 7<sup>th</sup> July 2023).* Additionally, digital platforms and e-commerce enhance public access to GI products, allowing grassroots innovators to broaden their market reach. The public key informant remarked:

*"...Digital platforms and social media can help local innovators reach customers they might not have been able to otherwise..." (Key informant, public, 7<sup>th</sup> July 2023).* Effective marketing strategies are crucial for raising awareness and building consumer trust, which Rogers (2020) underscores as essential for the successful adoption of local innovations.

However, several threats could undermine the public's role in supporting grassroots innovations. Competition from established brands with greater marketing and distribution resources remains a significant challenge. A respondent highlighted:

"...Big brands often dominate the market, overshadowing grassroots innovators." (Key informant, public, 7<sup>th</sup> July 2023). Economic instability further threatens public engagement, as it reduces consumer spending power, especially for premium priced GI products. As one informant explained:

*"...In tough economic times, people are less likely to spend on advertised grassroots products..."* (Key informant, public, 7<sup>th</sup> July 2023). Additionally, the influx of cheaper foreign products can diminish demand for locally-produced GI products. This aligns with Porter (2021), who discusses the competitive disadvantage that local innovations face when markets are flooded with lower-cost imports.

## **Partners**

Partners play a pivotal role in the grassroots innovation journey, providing essential technical expertise, financial resources and valuable connections that enhance the scalability and impact of grassroots innovation projects. As the key informant from FUNGUO program shared:

*"...The partners are essential in providing grassroots innovators financial resources and technical expertise through government entity such as COSTECH and MOEST..."* (Key informant, FUNGUO, 17<sup>th</sup> July 2023). This highlights the crucial nature of partnerships in facilitating the growth of grassroots innovations and aligns with Freeman and Soete (2020), who emphasize the importance of partnerships in expanding the reach and sustainability of innovations.

However, the effectiveness of these partnerships often centers on the alignment of goals and priorities between partners and innovators. Misaligned expectations can lead to delays and inefficiencies. As the key informant remarked:

*"...When our project outcomes do not match the expectations of our partners, it leads to delays and frustrations on both sides ..."* (Key informant, FUNGUO, 17<sup>th</sup> July 2023). This insight underscores the importance of ensuring clear communication and mutual understanding in partnerships, an issue also addressed by Akerlof and Shiller (2021), who note that mismatched goals can hinder the smooth execution of collaborative efforts.

Dependency on external partners introduces another layer of complexity, as it can threaten the long term sustainability of grassroots innovations. The partner expressed:

*"...If our priorities change or if we scale back our involvement, the entire project risks collapsing ..."* (Key informant, FUNGUO, 17<sup>th</sup> July 2023). Such dependency exposes grassroots innovations to vulnerabilities and emphasizes the need for innovators to build

internal capacities and reduce reliance on external support. This is particularly crucial for ensuring continuity and resilience in the innovation process.

Trust between partners and grassroots innovators is another critical factor that can determine the success of these collaborations. The key informant shared:

*“...Without trust between partners and grassroots innovators, the collaboration can feel more like an obligation than a mutual goal...”* (Key informant, FUNGUO, 17<sup>th</sup> July 2023). This sentiment highlights the importance of trust as a foundational element in partnerships, an idea also explored by Porter (2021), who identifies trust as key to fostering strong, mutually beneficial collaborations within innovation ecosystems.

Despite these challenges, significant opportunities exist for partners to play a more supportive and influential role in grassroots innovation. Aligning efforts with global sustainability goals not only enhances the credibility of grassroots innovations but also attracts investments. As the partner remarked:

*“...Aligning our efforts with global sustainability goals is opening doors for us...”* (Key informant, FUNGUO, 17<sup>th</sup> July 2023). This aligns with Rogers (2020), who points out that sustainability is increasingly becoming a strategic advantage for innovations, offering partners an opportunity to tap into larger networks and resources. Moreover, advancements in digital tools and platforms provide new avenues for collaboration, enabling partners to extend their reach and improve the innovation project outcomes. The key informant highlighted: *“...The availability of digital tools has allowed us to collaborate more effectively and scale our efforts more quickly...”* (Key informant, FUNGUO, 17<sup>th</sup> July 2023).

Nevertheless, threats to partnerships remain, particularly in the form of political and economic instability. A government key informant noted:

*“...If we face sudden political changes, funding from our international partners can be delayed or withdrawn ...”* (Key informant, COSTECH, 12<sup>th</sup> July 2023). This observation underscores the vulnerability of grassroots innovation projects to external shocks, especially in regions with unstable political environments. Furthermore, the rapid pace of technological advancement poses a challenge, as investments may become outdated before they can be fully implemented. A key informant explained:

*“...Some of the technology we invest in becomes outdated before it is fully implemented...”* (Key informant, FUNGUO, 17<sup>th</sup> July 2023).

Highlighting the need for adaptability and forward-thinking in planning and executing partnerships.

### Suppliers/Brokers

Suppliers and brokers are essential components of grassroots innovation, ensuring the steady availability of materials and resources crucial for the timely execution of innovation projects. Their ability to navigate market dynamics and source high-quality materials directly impacts the success and sustainability of these initiatives. The majority of innovators revealed that, they usually fail to optimize the full benefit of their innovation because they do not engage brokers/suppliers from the whole process of the innovation journey. This insight highlights the pivotal role that suppliers and brokers play in maintaining the momentum of grassroots innovations, ensuring that progress is not hindered by logistical challenges.

However, suppliers and brokers face several challenges that can undermine their ability to support grassroots innovation effectively. One of the primary challenges is the vulnerability of supply chains to disruptions caused by political instability, economic fluctuations or natural disasters. A broker shared:

*“...Political instability or economic fluctuations are always a concern for us, they can change prices or delay deliveries...” (Key informant, broker, 7<sup>th</sup> July 2023).* Such disruptions can have severe consequences, including delays and rising costs, both of which threaten the timely execution and financial viability of innovation projects. Furthermore, variability in material quality presents additional hurdles. As when quality fluctuates, it adds unnecessary costs and delays hindering the overall efficiency of grassroots innovation efforts.

The adoption of new technologies and sustainable practices also poses challenges for some suppliers. As a broker explained, “New sustainable practices are hard to implement... they come at a higher cost.” (Key informant, broker, 7<sup>th</sup> July 2023). This reflects the broader challenge faced by suppliers when integrating sustainable materials or practices into their operations. The higher upfront costs and uncertainty about the long-term benefits can make it difficult for suppliers to hold such innovations. According to Jensen and Thursby (2022), limited supplier engagement in innovation can reduce their effectiveness, particularly when suppliers fail to align their offerings with the specific needs of grassroots innovators. This misalignment can ultimately undermine both the quality and sustainability of the support provided by suppliers.

Despite these challenges, there are considerable opportunities for suppliers and brokers to play a more active and strategic role in grassroots innovation. With growing demand for sustainable materials, suppliers have an opportunity to differentiate themselves by sourcing locally and offering products that meet the increasing market demand for ethical and environmentally friendly options. One supplier shared:

*“...By sourcing sustainably, we can appeal to a more environmentally conscious market...” (Key informant, supplier, 7<sup>th</sup> July 2023).* This aligns with global sustainability trends, presenting an opportunity for suppliers to increase their market share by meeting the evolving expectations of consumers and innovators alike.

Technology also offers significant opportunities for suppliers to improve their operations. A broker noted:

*“...We are looking into technology to track deliveries better and improve transparency...” (Key informant, broker, 7<sup>th</sup> July 2023).* Indicating how advancements in digital tools can help reduce costs, improve supply chain reliability and foster stronger relationships with grassroots innovators. Moreover, brokers can play a vital role in facilitating networking and collaboration, which can drive the scaling of grassroots innovations. This aligns with the observations of Mazzucato and Semieniuk (2021), who emphasize the role of intermediaries in connecting innovators with the resources and networks they need for successful scaling.

Despite these opportunities, suppliers and brokers face ongoing threats that can challenge their ability to support grassroots innovation effectively. Economic instability, political changes, and competition from larger suppliers remain significant concerns. Economic downturns can drive up material costs and reduce availability, as one supplier pointed out:

*“...During economic downturns, material costs rise, making it harder to secure consistent supplies...” (Key informant, supplier, 7<sup>th</sup> July 2023).* Similarly, regulatory changes, such as new tariffs or trade restrictions, can disrupt market access, further complicating the supply chain. Additionally, larger suppliers that benefit from economies of scale can offer lower prices, creating competition for smaller brokers who may struggle to meet the cost-effective demands of grassroots innovators.

Lastly, a failure to align product offerings with community needs or sustainability standards can damage a supplier's reputation and business prospects. As one supplier remarked:

*“...If we do not meet sustainability standards or fail to understand community needs, we lose business and credibility...” (Key informant, supplier, 7<sup>th</sup> July 2023).* This insight underscores the importance of building long term relationships with innovators and ensuring that suppliers stay in agreement to the evolving needs of the communities they serve. By maintaining trust and relevance in the market, suppliers can secure their place in the grassroots innovation ecosystem.

## **Conclusion**

The Tanzanian grassroots innovation journey, as explored through the roles of various stakeholders, reveals a complex interplay of strengths, weaknesses, opportunities and threats within the innovation ecosystem. While there are notable efforts to support grassroots innovators, several challenges remain, particularly in areas such as coordination, funding and institutional involvement. Stakeholders, including grassroots innovators, government bodies, regulatory agencies and financial institutions, each play a vital role. However, their contributions are often hindered by systemic issues such as bureaucratic delays, insufficient resources and limited commitment. The analysis highlights the need for an interrelated, well-supported innovation framework that can better foster and advance grassroots innovations in Tanzania.

## **Recommendations**

To address the challenges identified through the SWOT analysis, several key actions are recommended to strengthen the grassroots innovation ecosystem in Tanzania. Firstly, it is essential to enhance awareness and outreach efforts, particularly in rural and underserved areas. This will ensure that all potential grassroots innovators are informed about available support systems, such as those offered by COSTECH. By improving the visibility and accessibility of these resources, the gap between grassroots innovators and the institutions designed to support them can be bridged.

Additionally, to foster greater commitment and efficiency among stakeholders, it is vital for the institution responsible to ensure that their staff are adequately compensated and incentivized for their contributions. This could involve revising payment structures and introducing performance-based rewards to motivate full engagement and dedication from technical officers and other stakeholders in supporting grassroots innovators.

Moreover, host institutions should be encouraged to provide timely and comprehensive support to innovators, particularly concerning the disbursement of funds. Clear guidelines and simplified processes can help reduce delays and ensure that innovators receive the necessary resources when needed.

Expanding the availability of innovation centers and spaces at the district level would also provide grassroots innovators with the necessary infrastructure and support. These centers should be equipped with the essential tools and staffed by knowledgeable experts to facilitate the innovation process from ideation to commercialization.

Lastly, financial institutions and organizations supporting grassroots innovation, such as COSTECH and banks, should revise their criteria and conditions for providing financial support. Simplifying these processes and making them more accessible to grassroots innovators can help ensure that promising ideas are not hindered by bureaucratic obstacles or stringent requirements.

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