

# Tanzania Rice Seed Sub sector Development Plan (2014-2018)

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*October 23, 2014*

MINISTRY OF AGRICULTURE, FOOD SECURITY AND COOPERATIVES  
UNITED REPUBLIC OF TANZANIA

## Executive Summary

Rice is one of the major staple food crops in Tanzania. Rice is largely grown by small holder farmers under irrigated-, rain fed lowland and rain fed upland ecosystems throughout the country. In the recent years, the total paddy production has increased from about 1.341 million tons in 2008 to about 1.8 million tons in 2012. The current national average productivity level of 2.2 t/ Ha is below the demonstrated potential under standard production environments. The low on-farm productivity is due to various constraints along the rice value chain.

The demand for rice consumption has in some years far exceeded the local production, thereby forcing the country to import rice grains. In 2009, Tanzania formulated National Rice Development Strategy (NRDS) which aims to increase rice production from 1.4 million tons in 2008 to 1.9 million tons by 2018. The NRDS, which is implemented through Tanzania Agriculture and Food Security Investment Plan (TAFSIP) under Agriculture Sector Development Program (ASDP), is aligned with Tanzania's Agricultural Sector Development Strategy (ASDS). One of the major strategic elements for achieving the targeted rice production envisaged under NRDS involves enhancement of production and supply of quality rice seeds in Tanzania.

Tanzania had legislated Seed Act in 2003; and had outlined regulations for the stakeholders engaged in seed sub-sector in 2007. However, neither national policies nor strategies defining the approaches for developing the seed sub-sector have yet been developed. Under a regional initiative, Coalition for African Rice Development (CARD) in association with the government of Tanzania intends to establish strategies for rice seed development. This document outlines the approaches that shall help develop the rice seed value chain in Tanzania.

Presently about 98% of the rice farmers embrace informal seed production and supply; whereby individual farmers save a portion of the rice grains produced in their land and use as seeds for the subsequent season. Formal system, on the other hand, involves production of improved rice seeds using well defined methods and subjecting their quality to inspection and certification by Tanzania's Official Seed Certification Institute (TOSCI); before they are supplied to the end-users.

Under formal system, the pre-basic seeds of improved rice varieties in Tanzania are mainly produced by the public research institutions located at Katrin and Dakawa. Basic seeds are multiplied from pre-basic seeds by the para-statal Agriculture Seed Agency (ASA) and other licensed private seed companies. The certified seeds are multiplied from basic seeds by private seed companies and distributed to farmers. In the recent years, registered individual farmers are formally allowed to produce quality declared seed (QDS) from certified seed. Since QDS is also subject to inspection and certification, QDS is increasingly gaining prominence as a major formal channel for seed production and distribution amongst farmers in Tanzania.

One of the major challenges faced by the formal seed production and inspection systems is the limitations in human-, technical- and financial resources. The public research and inspection institutions are chronically understaffed. To meet the growing demands, TOSCI engages subject

matter specialists (SMS), authorized district seed inspectors (ADSI), ward agricultural extension officers (WAEO) and village agricultural extension officers (VAEO) employed by local administrations in supervising the QDS production. However, the insufficient coordination between TOSCI and district-, ward- and village level officers lead to several distortions in the volume and quality of seed production and distribution.

Although the demand for quality rice seeds is fast rising amongst rice growers, clear projections on the seasonal requirements of rice seeds in the country are lacking. Present efforts to promote the demand for rice seeds by creating awareness on the advantages and seed production technologies are inadequate. Lack of regular planning and budget allocation for pre-basic and basic seed production affects the supply of seeds along the formal seed value chain. Inadequacy in such infrastructures as glass/screen houses, storage, feeder roads and rural electricity also lowers the production capacities of both the public- and private seed producers.

The proposed rice seed development plan aims to increase the adoption of quality rice seeds will increase from 2% to 15% by 2018. It envisages promotion of both the formal- and informal seed systems; whereby research and development on production and supply of seeds of improved rice varieties will be invigorated; efficiency of public and private seed production and distribution systems will be enhanced; the technical and financial competence of seed producers and suppliers shall be improved; quality of all seed classes will be increased by promoting best practices and farmers adopting informal seed systems will be guided to embrace the formal seed system. The private based rice seed production and supply will be enhanced by establishing public-private partnerships in developing infrastructures and by enabling regulatory- and financial environments for the production and marketing of quality rice seeds. QDS production systems will be improved through training and improved coordination and planning at grass root levels by local administrative institutions. It is conceivable that the implementation of the strategic approaches outlined in this document will enable tripling of rice production and thereby contribute to poverty alleviation and food security in Tanzania.

## Map



## Acronyms and abbreviations

- ADSI: Authorized District Seed Inspectors
- ASA: Agriculture Seed Agency
- AFSTA: African Seed Trade Association
- ASDS: Agricultural Sector Development Strategy
- ASDP: Agriculture Sector Development Program
- CAADP: Comprehensive African Agricultural Development Program
- CARD: Coalition for African Rice Development
- DDP: District Development Program
- DUS: Distinctness, Uniformity and Stability
- EAC: East African Community
- FAO: Food and Agriculture Organization
- ISF: International Seed Federation
- ISTA: International Seed Testing Association
- LGA: Local Government Authority
- MAFC: Ministry of Agriculture, Food Security and Cooperatives
- NRDS: National Rice Development Strategy

NSIDP: National Seed Industry Development Programme  
OECD: Organization for Economic Cooperation and Development  
QDS: Quality Declared Seed  
RCoE: Rice Center of Excellence  
RI: Research Institution  
SADC: Southern African Development Community  
SMS: Subject Matter Specialists  
TASTA: Tanzania Seed Trade Association  
TIC: Technical Inter-ministerial Committee  
TOSCI: Tanzania's Official Seed Certification Institute  
VCU: Value for Cultivation and Use  
VAEO: Village Agricultural Extension Officers  
WAEO: Ward Agricultural Extension Officer

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## 1. Introduction

Rice is one of the major staple food crops in Tanzania. Although rice is not a traditional crop; about 1.7 million households were engaged in rice farming in Tanzania in 2012<sup>1</sup>. Rice is produced predominantly by smallholder farmers under upland, rain fed lowland and irrigated ecosystems. Large and commercial scale production of rice takes place almost exclusively under irrigated ecosystem. In recent years, the total area under rice cultivation in Tanzania has increased from 557,991 Ha in 2007 to 799,361 Ha in 2012<sup>2</sup>. During the same period, the production of paddy has also increased by about 22.8%; from 1,341,846 tons to 1,800,551 tons (Fig. 1). The increments in cultivated area and total production of rice suggest that the yield has not been increasing and therefore recent advances made in rice production in Tanzania reflect changes in area under rice cultivation rather than productivity. The national average productivity of 2.5 t /Ha is slightly higher than the average rice productivity of 2.2 t /Ha in Sub-Saharan Africa<sup>3</sup> but much lower than the global average productivity of 4.3 t /Ha<sup>4</sup>.

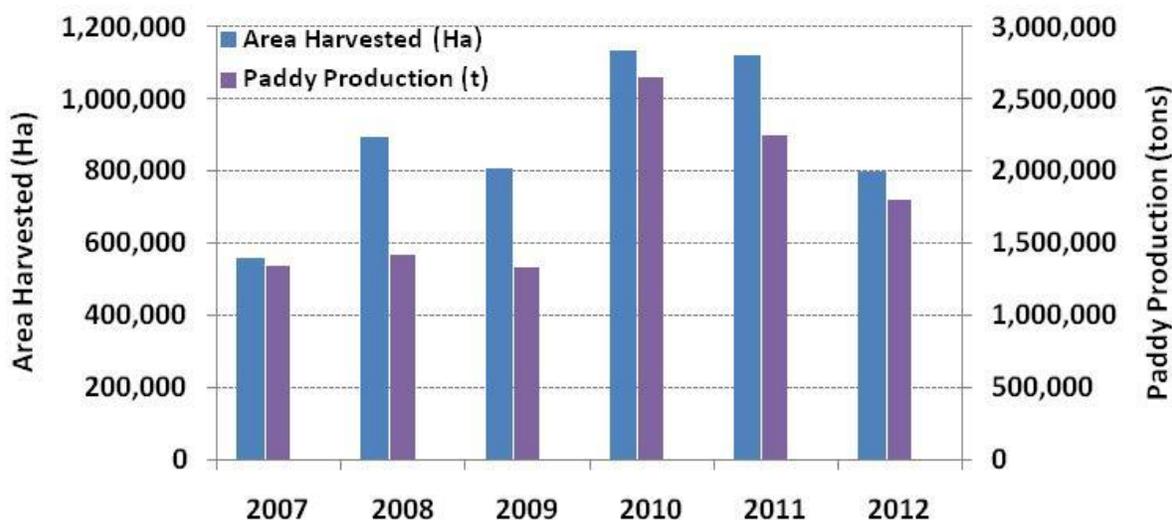


Fig 1: Trends in paddy production in Tanzania<sup>2</sup>

As consumers shift from traditional food grains such as sorghum and maize towards rice; the demand for rice consumption is also growing fast in Tanzania. At a per capita consumption rate of 25.4 Kg<sup>5</sup>; Tanzania's local rice production falls short of the rice consumption with a rice self sufficiency ratio of about 91% in 2010.<sup>6</sup> Owing to the fast rising demand for rice in the country,

<sup>1</sup> Population and Housing Census of Tanzania (PHC) (2012) Population Distribution by Administrative Areas, National Bureau of Statistics, Ministry of Finance, Tanzania

<sup>2</sup>FAO Statistics on Crop Production (<http://faostat3.fao.org>); referred on 28 June 2014

<sup>3</sup>African Agricultural Technology Foundation (2013) Raising the Productivity of Rice in Africa

<sup>4</sup>FAO Rice Market Monitor; Vol. 15 (2)

<sup>5</sup>Stryker D, Amin M (2012) Study of Policy Options for Increasing Tanzanian Exports of Maize and Rice – Improving Food Security to 2025; USAID/AIRD

<sup>6</sup>Bill & Melinda Gates Foundation (2012) Developing the rice industry in Africa – Tanzania assessment

the gap between local production and consumption has widened from about 178,097 tons of milled rice in 2007 to about 321,883 tons in 2012 (Fig. 2). Food and Agriculture Organization (FAO) predicts that at the present consumption trends, the national rice consumption would triple and that the deficit could grow into 2.84 million tons by 2020.<sup>7</sup>

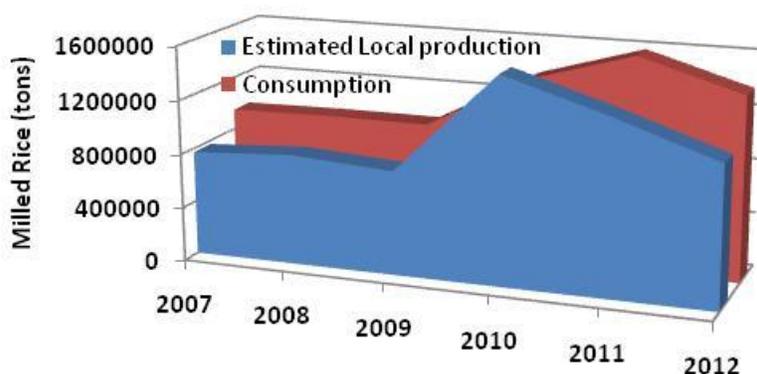


Fig. 2: The gap between local production and consumption of milled rice in Tanzania<sup>8,9</sup>

A majority of smallholder rice farmers grow rice mainly for household consumption and yet sell a significant amount of their production in the local markets<sup>10</sup>. FAO studies<sup>7</sup> reveal that in Tanzania, rice is more commercialized than any other staple food crops with about 42% of production being marketed. Thus rice assumes significance in food security and economic growth in Tanzania. Socio-economic analyses made on three major crops rice, maize and cotton have shown that gross margin earned by farmers growing rice is superior to other crops in Tanzania<sup>11</sup>. Since rice serves both as cash and food crop, income earned from rice farming significantly improves the financial capability of poor farmers in purchasing goods such as ploughs, and services such as school fees and health care. Women play a significant role in rice production in Tanzania as they engage in a range of farming activities as planting, weeding, irrigation/water management, harvesting, post-harvesting and marketing/trading; rice farming broadens the scopes of achieving gender equality in rural areas<sup>12</sup>.

<sup>7</sup> Food and Agriculture Organization (2012) Tanzania's rice sub-sector and value chain – Analysis & Review and proposed vision & strategy for improved competitiveness & growth

<sup>8</sup> Consumption demand estimates from <http://www.indexmundi.com/agriculture/?country=tz&commodity=milled-rice&graph=domestic-consumption>

<sup>9</sup> Local production of milled rice was estimated from paddy production by subtracting 10% for feed, seed and post harvest losses and assuming a 65% milling recovery

<sup>10</sup>Rural Livelihood Development Company (2009) Improving rice profitability through increased productivity and better marketing

<sup>11</sup>Ngailo JA, Kaswamila AL, Senkoro CJ (2007) Rice production in the Maswa district, Tanzania and its contribution to poverty alleviation; *In: Research on Poverty Alleviation*

<sup>12</sup>JICA (2010) Rice Production in Value Chain with a Gender Perspective in Tanzania – A case study by JICA

The Tanzanian government, development partners, private sector, and civil societies have in recent years demonstrated a sustained commitment to develop rice sub-sector. With assistance from the Coalition for African Rice Development (CARD), Tanzania developed National Rice Development Strategy (NRDS) in 2009. The NRDS seeks to increase annual rice production from 0.875 (2007/2008) to 1.963 million tons by 2018 by raising the average rice crop productivity level to 2.8 t/Ha and convert large rain-fed lowland area to irrigated land. The expected increase in the yield will be generated by increased use of improved seed, fertilizer, and expanded irrigated land. NRDS proposes interventions in such key strategic elements as (a) seed systems and fertilizer distribution; (b) varietal improvement; (c) irrigation and water harvesting technology; (d) mechanization; (e) research and extension; (f) finance; (g) post-harvest and marketing of rice; and (h) processing.

Table 1: Paddy (*converted to rice*) production and yield by agro ecological conditions

Year	Rain-fed upland			Rain-fed lowland			Irrigated			Total		
	Area (Ha)	Yield (Tons)	Production (Tons)	Area (Ha)	Yield (Tons)	Production (Tons)	Area (Ha)	Yield (Tons)	Production (Tons)	Area (Ha)	Yield (Tons)	Production (Tons)
2008	17	0.5	9	464	1	464	200	2.13	426	681	1.3	899
2013	21	1	21	374	1.5	561	290	3	870	685	2.1	1,452
2018	31	1.6	50	274	2	548	390	3.5	1365	695	2.8	1,963

Note: Area ('000 ha), yield (t/ha) and production ('000 tons)

Source: NRDS (2009)

The NRDS is structured to complement Tanzania's Agricultural Sector Development Strategy (ASDS). The ASDS is implemented through the Agriculture Sector Development Program (ASDP). About 70 percent of ASDP budget is allocated for District Agricultural Development Plans (DADPs). A recent review of the currently available resources for rice sub-sector reveals that investments have increased recently under the ASDP-I (2006-2013)<sup>13</sup>. Nevertheless, several gaps still exist along the rice value chain which requires additional investments under ASDP-II.

Increasing production and productivity of rice by increasing availability and access of agricultural inputs is one of the short term strategies defined under Tanzania's NRDS. CARD has recently launched an initiative with a goal of improving the supply of quality rice seeds in CARD member countries. Tanzania is one of the target countries under this CARD initiative. This document analyzes the current situation of rice seed production, supply and distribution in Tanzania; and outlines a strategic plan for improving the rice seed sub-sector in Tanzania.

<sup>13</sup>NRDS taskforce (September 2013) Subsector Intervention Element Matrix (SIEM) for rice sector in Tanzania – Resources and gaps

## 2. Review of National Rice Seed Sector

### 2.1. Legislation, Policy, Institutions and Planning Aspects

#### 2.1.1. Legislations

Development of a formal seed sub-sector in Tanzania started as early as in 1973; with enactment of Seeds Regulation of Standards Act. In 1989, the Government of Tanzania launched the National Seed Industry Development Programme (NSIDP). This allowed private seed companies to enter into seed business in Tanzania. In 2003, Tanzania enacted a Seed Act<sup>14</sup>, repealing the earlier act of 1973. This legislation sets the framework for seed sub-sector in the country; and recognizes the importance of public institutions and private seed companies in contributing to the production, certification and supply of seeds. The Act allowed the establishment of Tanzania's Official Seed Certification Institute (TOSCI). Under the Act, Agriculture Seed Agency (ASA) was also established to produce and distribute foundation and certified seeds from public varieties in 2006. While ASA is involved in multiplication of seeds, TOSCI is responsible for varietal release, varietal registration, seed testing and certification, and training of seed producers.

Regulations associated with the current Seed Act of 2003 were introduced in 2007. These regulations propose several measures to ensure that the seeds produced and imported meet a set of required standards. The regulations also encourage active participation of private sector in seed production and distribution in the country. This has prompted proliferation of private seed companies in Tanzania. The regulations also allow 'Quality Declared Seed (QDS)' as a formal mechanism whereby registered individual small holder farmers shall engage in on-farm seed production and seek formal certification of the produced seeds.

#### 2.1.2. Policy

Tanzania has not yet developed an exclusive national seed policy; and hence the principles outlined under national agricultural policy<sup>15</sup>, Seed Act (2003) and the associated addendums/circulars from Ministry of Agriculture, Food Security and Cooperatives (MAFC) serve as guidelines for varietal release, production and distribution of seeds and other agricultural inputs such as fertilizers and pesticides. Prior to the release of any rice variety in Tanzania, the formal institutions involved in varietal development need to get their research data verified through National Performance Trials (NPT) by TOSCI. In collaboration with Seed Unit under Directorate Crop Development (MAFC) and Directorate of Research and Development (MAFC), TOSCI also undertakes Distinctness, Uniformity and Stability (DUS) test on varieties before authorizing the multiplication of pre-basic and basic seeds.

Under the MAFC, the National Seed Committee comprised of key stakeholders of the seed value chain, functions as an advisory body to the Government. The current Seed Act and Regulations endorse the principles of regional harmonization and are in agreement with the

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<sup>14</sup> Government of United Republic of Tanzania, The Seeds Act, No. 18 of 2003

<sup>15</sup> Ministry of Agriculture, Food Security and Cooperatives (2013) National Agriculture Policy

trading regulations involving other countries in the East African Community (EAC) and Southern African Development Community (SADC). Accreditation of TOSCI by International Seed Testing Association (ISTA) and Organization for Economic Cooperation and Development (OECD) is currently under the process. The expected accreditation of TOSCI shall further expand the scopes of seed trade by the private seed companies in Tanzania with the neighboring countries. Legislations such as the Plant Protection Act (1997), Plant Breeders Rights (2002) further ensures the rights issues on varietal development and seed multiplication by public- and private seed producers in the country. Presently, strategies to develop seed sub sector of all crops that are propagated through seeds and/or vegetative materials are being drafted. These strategies shall outline the various approaches through which the seed value chain could be enhanced. Although the seed strategy is yet to be finalized, the rice seed development plan proposed in this document shall be presumed to be in alignment with overarching national agricultural sector strategies and policies.

### 2.1.3. Institutional frameworks

Key research and development institutions engaged in pre-basic and basic rice seed production in Tanzania include Sokoine University, National Agricultural Research Institutes located in Morogoro region (Katrin (RCoE) and Dakawa). In addition to these institutions; ASA and private seed companies are also engaged in basic- and certified rice seed production. Major private companies engaged in rice seed production include TANSEED International, AgriSeed Technologies, Meru Seed Company, Kipato Seed Company and Brac Seed Company. Registered individual QDS producers, located in different parts of the country, are engaged in quality declared rice seed production.

*Table 2: Institutions and/or Departments responsible for rice seed production, inspection and supply*

		Name of institutions	Roles/Responsibility	Legislations/Policies determining responsibility	Remarks
Pre-basic Seed	Production	Sokoine University, RIs: KATRIN (RCoE) and Dakawa	Production of pre-basic seeds	Seed Act 2003 and its Regulation of 2007	
	Inspection	TOSCI	Certifies the pre-basic seed	Seed Act 2003 and its Regulation of 2007	
	Supply/distribution	Sokoine Univ., RIs: KATRIN and Dakawa	Supplied to ASA and private companies	Seed Act 2003 and its Regulation of 2007	
Basic Seed	Production	ASA and licensed private companies	To produce basic seed for Seed Companies and QDS producers	Seed Act 2003 and its Regulation of 2007	
	Inspection	TOSCI	Seed and Field inspection	Seed Act 2003 and its Regulation	

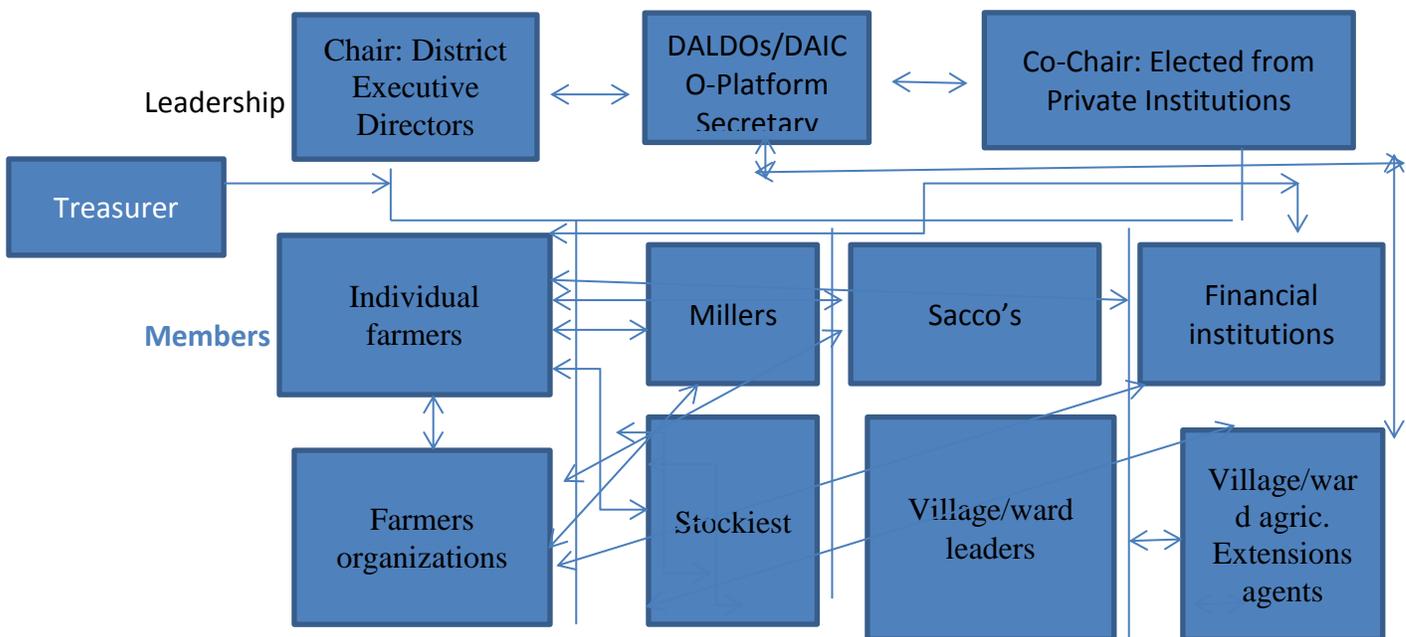
	Supply/ distribution	ASA – Marketing Department	Supply and distribute basic seed to Seed Companies and QDS producers	of 2007 Seed Act 2003 and its Regulation of 2007	
Certified Seed (I & II)	Production	ASA, Seed companies	To produce certified seed for farmers	Seed Act 2003 and its Regulation of 2007	
	Inspection	TOSCI	Seed and Field inspection	Seed Act 2003 and its Regulation of 2007	
	Supply/ distribution	ASA and Seed companies	Supply and distribute certified seed to farmers	Seed Act 2003 and its Regulation of 2007	
Quality Declared Seed	Production	QDS producers	To produce QDS for the neighboring rice producing community	Guidelines for control of QDS, 2007 (MAFC)	
	Inspection	TOSCI with the assistance of ADIs	Seed and Field inspection	Guidelines for control of QDS, 2007 (MAFC)	
	Supply/Dist ribution	QDS producers themselves	Within the ward where QDS is produced	Guidelines for control of QDS, 2007 (MAFC)	

Several initiatives and agricultural support programs from the government and development partners facilitate multiplication and distribution of rice seeds in Tanzania. Tanzania hosts the Rice Centre of Excellence (RCoE) under the World Bank's flagship regional program titled Eastern Africa Agricultural Productivity Program (EAAPP). Under the G8 member countries' New Alliance for Food Security and Nutrition, Tanzania is one of the countries where commercialization, distribution and adoption of seeds are sought in order to increase smallholder yields and resilience to climate change. Other major projects addressing the issues in seed sub-sector in Tanzania include Technical cooperation for supporting rice industry development (TANRICE) project by JICA, Feed the Future project and Increased agricultural growth and expand the staple food supply project by USAID and Support for agricultural research and development for specific crops (including rice) by African Development Bank.

An exclusive platform or forum through which dialogues amongst various public and private stakeholders of seed sub-sector could take place is presently not yet active in Tanzania. Nevertheless, there are a few formal forums available for the seed value chain actors to engage in discussions. Tanzania Seed Trade Association (TASTA) was established in 1999 with the objective of promoting the seed trade; and works closely with the MAFC on seed policy issues. TASTA is a member of the National Seeds Committee, International Seed Federation (ISF) and the African Seed Trade Association (AFSTA). While it is not necessary for all the seed producing

companies to register with TASTA; TASTA represents a forum for private seed producers to engage in policy dialogues with the government and other stakeholders in the seed value chain. Initiatives such as EAAPP, Scaling Seed Technologies and Partnerships (SSTP) and CARD also provide opportunities for public and private stakeholders to discuss challenges and opportunities for rice seed sub-sector. Recently, Tanzania Rice Council and District Rice Platforms are being established in rice production areas. It shall be expected that these forums will provide avenues for seed producers and users (farmers) to hold dialogues on seed issues. The diagram below tries to show the expected interaction and networking of the platform members once fully implemented as each member in the platform need a fellow member at some point in their operation.

**District Rice Platforms organization relationship**



**2.1.4. Planning**

ASA undertakes annual planning process for rice seed production. The cost of production for certified seeds at ASA ranged between 1,300,000 TZS and 1,500,000 TZS per hectare in 2013. Individual seed companies also incorporate budget for rice seed production on an *ad hoc* basis of seasonal/annual demand.

## 2.2. Production

The production of the pre-basic, basic, certified and quality declared seeds in Tanzania since 2007-08 are shown in table 3. In 2011/12; a total of 905.2 metric tons of certified/QD seeds were produced. In 2012-13; about 1,800,551 ton of paddy were produced from 799,361 Ha. Although the seed rate adopted by farmers depend on the method of planting (direct sowing or transplanting), on an average, about 45 Kg/Ha of seeds are presently being used by rice farmers in Tanzania. With an observed national average on-farm yield of 2.2 t/ Ha; a seed/grain ratio of 1:49 is estimated. From the an estimated total production level of 2,248,320 tons of paddy in 2011/12 and a total of 905.2 metric tons of certified/QD seeds produced the same year qualify the suggestion that t usage of such formal seeds amounts to only 2.0%.

*Table 3: Current production (in metric tons) of the various seeds of rice in Tanzania<sup>16</sup>*

Seed class	2007/2008	2008/2009	2009/10	2010/2011	2011/2012	2012/13	remarks
Pre basic	3.2	0	8.9	5.8	26.7	0.9	In most cases variations in volumes over years are due demand fluctuations and carry overs. For instance, various initiatives by the government such as KILIMO KWANZA, and SAGCOT and BRN has resulted to increased volume of pre-basic produced with expectations that such initiatives would have triggered more demand of certified seeds something hasn't much happened.

<sup>16</sup> Seed Unit, Ministry of Agriculture, Food Security and Cooperatives

Basic	17.3	23	55.8	90	37.5	1.2	
Certified	149.5	784.9	951	950	821.7	816	
QDS	20.1	9.2	21	107	83.5	not yet available	

The quantity of certified seed produced varies with different cultivars. The amount of seeds of the popular cultivars produced by ASA is shown in table 4. TXD 306 is the most consistent variety for which certified seeds are produced over the past 5 years.

Table 4: The amount of seeds of the popular cultivars produced by ASA Production of certified seeds of different cultivars between 2008/09 and 2012/13 in Tanzania<sup>16</sup>

TXD 88	TXD 306	TXD 85	Supa India	Mwanga za	NERICA 1	NERICA 2	NERICA 4	NERICA 7	WAB 450-12
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2008 /2009	47.14	89.48		12.30	0.60	-	-	-	-	-
2009 /2010	-	745.50		-	-	-	-	-	-	-
2010 /2011	-	950.00		-	-	-	-	-	-	-
2011 /2012	-	905.2		-	-	-	-	-	-	-

Until recently, only the public institutions were allowed to conduct crop improvement through selection and/or introduction of varieties. However the government of Tanzania has released a circular revising the regulations on the involvement of private seed companies in varietal improvement in 2011<sup>17</sup>. Under this revised regulations; both the public and private institutions are permitted to develop and/or introduce new rice varieties and multiply the pre-basic and basic seeds of all the approved/registered varieties in Tanzania. However, the private seed companies are not yet fully engaged in the activity of varietal improvement in the country. Hence the pre-basic seeds of rice varieties are presently produced almost exclusively in public research institutions located at Sokoine University, KATRIN and Dakawa. The key players in supply chain of paddy seeds of market varieties and subsistence varieties are shown in table 2.

The basic seeds are produced (from pre-basic seeds) by ASA and licensed private seed companies in their own seed farms and/or in farmers' fields through contract farming. Under the contract farming, ASA identifies progressive farmers who could produce quality seeds under their supervision and enters into an agreement for the purchase of certified seeds at a pre-determined price and/or market prices (whichever is higher). The seed producers agree to multiply seeds according to the standards and conditions stipulated by ASA. In some seasons, ASA is also engaged in production of basic seeds from pre-basic seeds through contract farming. The private companies are presently however not actively engaged in either pre-basic or basic seed production despite of the revision of the Regulations in 2011.

The certified seeds are produced by ASA, licensed private seed companies, registered QDS producers and contracted individual rice farmers in the country. In some instances, two rounds of certified seeds (certified-1 and certified-2) are produced in Tanzania. The registered seed companies produce the certified-1 seeds from basic seeds and the certified-2 seeds from certified-1 seeds. The registered QDS producers produce (i) QDS-1 and (ii) QDS-2 seeds which are produced from QDS-1 seeds. Since the QDS production is recognized by MAFC; it qualifies under 'formal' system of rice seed production.

The informal rice seed production thus involves those individual farmers who save a portion of the paddy grains from the general lots of production or grains harvested from a selected set of plants or plant population from their own fields. The names of varieties that are officially certified by TOSCI and recommended by the government are shown in table 5.

*Table 5: Names of varieties recommended for the various ecosystems and certified by TOSCI*

Agro-Ecological Zones	Name of Varieties
Irrigated Lowland	TXD 306, TXD 88, TXD 85, Dakawa, KATRIN, IR 22, IR 54, Tai, Komboka

<sup>17</sup> Ministry of Agriculture, Food Security and Cooperatives (7 June 2011) Memo on the roles of private stakeholders in crop improvement in Tanzania

Rain-fed Lowland	TXD 306, TXD 88, TXD 85, SUPA, Mwangaza, Kalalu, Dakawa, KATRIN, IR 22, IR 54, Tai, Komboka
Rain-fed Upland	NERICA 1, NERICA 2, NERICA 4, NERICA 7, WAB 450-12-2-BL1-DV4

In recent years, several private seed companies are gaining prominence in rice seed markets in Tanzania. Presently a total of 66 private companies have registered their participation in seed business in Tanzania. Of these, about 4 companies namely TANSEED International, AgriSeed Technologies, Meru Seed Company and Kipato Seed Company are actively engaged in production and distribution of rice seeds. With the recent policy liberalization of production of basic seeds and research and development of new rice varieties by private companies, it shall be expected that the private seed companies will play a dominant role in production and distribution of certified seeds of rice in Tanzania.

## 2.3. Quality Control

### 2.3.1. Methods

TOSCI is the sole authority for certification of rice seed production in Tanzania. Due to the limited human- and financial capacities in covering the inspection and certification processes of seeds of all released rice varieties throughout the country; TOSCI engages trainings for subject matter specialists (SMS), authorized district seed inspectors (ADSI), ward agricultural extension officers (WAEO) and village agricultural extension officers (VAEO) who are employees of local government supervising the seed production, field inspection, seed testing and certification of QDS. The seeds stored by individual farmers under informal production systems are out of the scopes of inspection by the TOSCI. Table 2 shows the institutions and officers responsible for production and inspection of rice seeds produced under formal systems in Tanzania.

Table 6: Purity Standard of Seeds

	Pre-Basic	Basic	Certified1	Certified2	QDS
Purity (%; Minimum)	98.0	98.0	98.0	98.0	98.0
Other seed (%; Maximum)	0.1	0.1	0.1	0.1	0.1
Inert matter (%; Maximum)	1.9	1.9	1.9	1.9	1.9
Moisture content (%; Maximum)	13.0	13.0	13.0	13.0	13.0
Germination (%; Minimum)	80	80	80	80	80
Blast <i>Magnaportheoryzae</i> (%; Maximum)	1.0	1.0	0.2	0.2	0.2
Bacterial leaf blight <i>Xanthomonasoryzae</i> (%; Maximum )	1.0	1.0	2.0	2.0	2.0

White tip nematode <i>Alpholenchoidesbesseyi</i> (%; Maximum)	0.0	0.0	0.0	0.0	0.0
Objectionable weed seed (%; Maximum)	0.0	0.0	0.0	0.0	0.0
Restricted noxious weed seed (Maximum)	4 per kg				

Source: Seed Regulations (2007)

As seen from Table 6, TOSCI insists on standard criterion of purity standards shown for all the different classes of seeds. The minimum expected purity level of the seeds of different classes is set as 98.0%. The field inspection measures taken by TOSCI for registered and quality declared seed producers are harmonized with OECD and FAO standards. Distinct Uniformity Stability (DUS) Test is carried out by TOSCI to determine genetic purity of a particular variety. Value for Cultivation and Use (VCU) Test is also carried out by TOSCI for assessing the performance of the candidate varieties before their release. Furthermore, TOSCI concludes laboratory tests whereby germination test, physical purity and health attributes are assessed.

For QDS, due to human capacity constraints, TOSCI engages Authorized District Seed Inspectors (ADSI) for carrying out the inspection of fields. The inspection is done through inspection of fields and harvested seeds.

During field inspection, TOSCI recommends the adoption of the following factors by seed producers;

- (a) *Selection of a Agro-climatic Region*:- A rice variety to be grown for seed production in an area must be adapted to the photoperiod and temperature conditions prevailing in the given area.
- (b) *Selection of seed plot*:- The area in which the seed plots are selected should not have grown the same crop. The plot selected for rice seed must be free from volunteer plants, weed plants and have good soil texture and fertility. The soil of the seed plot should be comparatively free from soil borne diseases and insects pests.
- (c) *Isolation distance*:- The rice crop must be isolated from other nearby fields of the same species and the other contaminating crops by at least 5 m for pre-basic and basic seeds and at least 3 m for certified seeds.
- (d) *Time of planting*:- Rice crop should invariably be sown at their normal planting time. Depending upon the incidence of diseases and pests, some adjustments, could be made, if necessary.
- (e) *Roguing*:-Roguing must be done at (i) vegetative / pre-flowering stage, (ii) flowering stage; and (iii) maturity stage
- (f) *Weed control*:- The seed plot in which rice is grown should be free of weeds at all stages.
- (g) *Pest and disease control*:- The occurrence of pests and diseases and the overall health of plant population is scored by the inspectors. The field in which seed is produced should be totally free of pest- and disease incidences.

On arrival on the farm, the grower or his representative should always whenever possible accompany the seed inspector during the field inspection. This is particularly important in the case of a crop rejection or withdrawal of the crop from the certification scheme. During the

inspection, a general view of the crop is first done, followed by a detailed inspection of the crop. A quadrant walking pattern for every square meter for 10 random quadrants is followed to maximize field coverage. Within each quadrant a careful search is made for off-types and their numbers are counted. After the harvest, seed sampling is performed to assess the quality of seeds. The sampled seeds are generally tested for quality attributes such as analytic purity, germination, moisture content and seed health. The protocols for field inspection and assessment of harvested seed lots are summarized in tables 7 and 8 respectively.

*Table 7: Procedure and methods of on-plot seed inspection*

Seed class	Organization s/institutions in charge of inspection	Frequency and timing of inspections	Necessary tools for inspection	Inspection methods	Quality Standard for Inspection
Pre-Basic Seed	TOSCI	(1) First field inspection during flowering to check isolation, rogues, and other relevant factors (2) Second field inspection is made prior to harvest and after the seed has matured	An inspector must obtain a field number of that particular field from the certifying institute, field numbers are issued to every registered farmer. Measuring tape for verification of isolation distance, Rice field seed standards, a pen, notebook, field inspection report form, if it is available GPS instrument to verify location and acreage of the field and cultivar description to help an inspector when conducting cultivar assessment.	The post-harvest inspection of a seed crop covers the operations carried out at the threshing floor, transport of the raw seed produce to the processing plant, pre-cleaning, grading, seed treatment, bagging and post processing storage of the seed lot.	Described in 2-10
Basic Seed	TOSCI	As for Pre-Basic Seed	As for Pre-Basic Seed	As for Pre-Basic Seed	As for Pre-Basic Seed
Certified	TOSCI	As for Pre-Basic	As for Pre-Basic Seed	As for Pre-	As for Pre-

-1 Seed		Seed		Basic Seed	Basic Seed
Certified - 2 Seed	TOSCI	As for Pre-Basic Seed			
9QDS	TOSCI/Authorized District Seed Inspectors, WAEO/VAEO	As for Pre-Basic Seed			

### 2.3.2. Human Resource

Presently the two agricultural research institutes located in Morogoro-t Katrin and Dakawa are engaged in pre-basic and basic rice seed production. There are a total of about 8 technical personnel. About 4 staffs who are experienced (>10 years) in rice seed production are close to retirement age; while the rest were relatively young and inexperienced (<10 years). ASA is practically producing most of the basic seeds for rice in Tanzania. About 10 technical staffs are presently engaged in rice seed production at ASA.

Most of the private seed companies producing rice seeds generally hire or allocate core staffs on a need basis, a few of the private companies have designated technical staff for rice seed production throughout the year. For instance, while Tanseed International engages about 15 staffs, Agro Seed Technologies engages about 5 staffs throughout the year rice seed production and distribution. TOSCI has a total of 25 technical staff involved in seed inspection and certification that covers all crops and are scattered in central, northern, southern highland and lake zones. Their level of qualifications varies from diploma to PhD level.

In association with Seed Unit (MAFC), the TOSCI conducts training program for district seed inspectors authorized under Seed Act. The duration of the training is usually for 3 weeks. The program targets district level extension agents (WAEOs and VAEOs) as the primary beneficiaries. The contents of the training courses include principles and techniques of seed production and supply system, identification of varietal traits, roguing, seed handling, seed testing, seed quality control, implementation of quality declared seed (QDS) production, rules and procedures for control of QDS production, the designing of QDS production, seed sampling, field inspection, seed extension and seed marketing.

### 2.4. Supply

Rice seed supply chain largely starts from the two major research institutions located at KATRIN and Dakawa. The key stakeholders engaged in rice seed supply chain in Tanzania are shown in table 2. The breeders at the public research institutions thus play a critical role in supplying quality pre-basic seeds of all released rice varieties. These pre-basic seeds are then distributed to ASA and private seed companies.

The basic seeds produced by and ASA are generally distributed by ASA to registered private seed companies for the production of certified seeds. Registered private companies who intend to multiply and sell seeds in Tanzania can register through MAFC. The certified seeds produced by private companies are sold to rice farmers through their own marketing networks in rice production areas. Certified-1 seeds are distributed to both private seed companies and end-users (rice farmers) for rice production. Certified-2 seeds which are multiplied from certified-1 seeds (mostly by the producers of certified-1) are normally distributed to end-users (rice farmers). Both ASA and private seed companies have established agro-dealer networks in most parts of the country. The current government regulations stipulate that the seeds produced by QDS producers shall be marketed only to rice farmers who are located within the ward in which the seeds are produced.

Govt. subsidizes a variable portion of the ear marked price of seeds and distributes to farmers. The subsidy usually ranges from 10% to 50% of market prices of the seeds through voucher systems. In a decentralized approach, the district, ward and village input committees select the suppliers of seeds. Using the vouchers distributed to targeted beneficiaries; the farmers shall procure rice seeds from the designated agro-dealers by paying the extra cash required on top of the subsidized amount. In Tanzania, the rice growers in irrigation schemes demand quality seeds more frequently than the farmers in other production environments. It shall be noted that such farmers grow rice twice a year and often prefer to grow one or two market preferred varieties. Given the environmental risks involved in the rain fed lowland and upland ecosystems; farmers growing rice in these environments cultivate more than one variety in a year. Depending on the accessibility and affordability, the rice farmers in rain fed lowland and upland production environments renew their seeds only after several seasons/production cycles.

The prices of rice seeds in Tanzania are highly de-regulated and are subject to market. Along the supply chain; the pre-basic seeds produced by research institutions are distributed to ASA and private companies at service based government prices. The prices of basic seeds are determined on the basis of production costs and profit margins. The prices of certified seeds are determined by the production costs, prevailing paddy grain price and profit margins. Seed companies largely determine the prices based on the production costs and demand factors. Nonetheless, since ASA, a para-statal organization is also involved in seed production and distribution, the profit margins of private seed companies are constantly under pressure as ASA seasonally announces a competitive price for the seeds produced through public system. Thus the price set by ASA often serves as a benchmark for private seed producers in the country.

*Table 10: Purchase price from seed multipliers and sales price of certified seed*

Currency: (Approximate exchange rate: 1 = USD )			
	Name of Varieties	Purchase price	Sales price
Irrigated Lowland	TXD 306, TXD 88, TXD 85, Dakawa, KATRIN, IR 22, IR 54, Tai, Komboka	3000 Tsh/Kg produced by Private companies and purchased by ASA	2000 Tsh/Kg – ALL varieties by ASA
			2000 Tsh/Kg – ALL varieties by private seed

			companies
Rain-fed Lowland	TXD 306, TXD 88, TXD 85, SUPA, Mwangaza, Kalalu, Dakawa, KATRIN, IR 22, IR 54, Tai, Komboka	3000 Tsh/Kg by produced private companies and purchased by ASA	2000 Tsh/Kg – ALL varieties by ASA
			2000 Tsh/Kg – ALL varieties by private seed companies
Rain-fed Upland	NERICA 1, NERICA 2, NERICA 4, NERICA 7, WAB 450-12-2-BL1-DV4	3000 Tsh/Kg by produced private companies and purchased by ASA	2000 Tsh/Kg – ALL varieties by ASA
			2000 Tsh/Kg – ALL varieties by private seed companies

Furthermore, the government periodically announces subsidies for seeds of rice varieties sold through retail outlets. Since private companies shall redeem the subsidized portion of the prices from the government, the market prices of rice seeds are generally not subject to wild fluctuations. The price for QDS is set based on the local production costs and the market price for certified seeds. In cases where the community is engaged in producing the QDS, the price is often determined by QDS producers/groups themselves.

Although less effective, presently the district rice platforms are used for engaging the dialogues between public- and private stakeholders of rice seed sub-sector. Such district rice platforms are functional in such rice growing regions as Morogoro, Mbeya, Mwanza and Shinyanga. Tanzania Seed Trade Association (TASTA) serves as a forum for the registered private seed companies in Tanzania. With a membership of 41 registered companies, the TASTA provides a platform for discussing seed regulations and policies such as subsidies, Value Added Tax (VAT), input subsidies, finance and seed trade with the government<sup>18</sup>.

### 3. Challenges in National Rice Seed Sector

#### 3.1. Legislation, Policy, Institutions and Planning

Despite having the Seed Act, Tanzania has not yet outlined national seed policies nor national development strategies for seed sub sector. National seed development strategies and policies could have helped setting a framework for the overall and cohesive development of seed sub-sector and targets for individual crops. Availability of a transparent strategic roadmap could facilitate a clear understanding of the roles of the various seed value chain actors and stakeholders. Thus the lack of national seed policies and strategies blurs the scopes of actions by the various stakeholders. In the absence of national seed development strategies, the development partners and donors lack clear directions on investments and hence are not able to efficiently contribute to the advancement of the seed sub-sector. For instance, the public fund allocations for the seed sub-sector and provision of subsidy for seeds have largely been inconsistent across the financial years for rice seed. This affects the planning process by both

<sup>18</sup><http://afsta.org/membership/tanzania-seed-trade-association-tasta/>

the public- and private institutions engaged in seed production. Consequently, the various ongoing interventions in the seed sub-sector are fragmented, weak and lack coherence.

There is also a lack of understanding on the seed rules and regulations among the various stakeholders involved in seed movement. For instance, the inability to distinguish seeds from ordinary grains and the lack of recognition of TOSCI's certification tags by Tanzania Revenue Authority (on crop cess and other tax regulations) and local authorities cause delays in movement and distribution of seeds across the district borders. Furthermore, the present restrictions on marketing and distribution of QDS within the ward have affected the marketing of QDS inside the country. This restriction affects the marketing scopes and business expansion of entrepreneurial QDS producers.

The lack of accreditation of TOSCI's seed testing laboratories by International Seed Testing Association (ISTA) and Organization for Economic Cooperation Development (OECD) has also slowed the inability of Tanzania's seed producing companies in engaging in regional seed trade with other rice growing countries. Although marketing of seeds through private agro-dealers has substantially increased in the recent years, the private seed companies still to a large extent depend on public procurement process for marketing the seeds produced. This is due to poor market demand for quality rice seeds amongst rice growers. It is believed that the poor demand stems from low levels of awareness and low-risk low-input nature of smallholder rice farming. In a vicious cycle however, the poor demand leads to poor supply.

The production data from formal rice seed production systems suggest that only about 2% of the rice farmers adopt formal rice seed. About 98% of the rice farmers thus resort to informal means of farmer-saved means of seed production and supply. Although rice farmers in Tanzania are becoming increasingly aware of the importance of quality seeds; the inadequacy in the current promotional activities for adoption of new and improved rice seeds slows the demand creation process. Furthermore, in the absence of surveys on uptake of quality seeds amongst rice farmers, it becomes difficult for institutions engaged in rice seed production in order to comfortably predict the demand for rice seeds.

### **3.2. Production and Quality Control**

The quality of pre-basic, basic and certified seeds of all the existing rice varieties are facing deterioration in Tanzania. Tackling the factors that contribute to such deterioration during production stages needs immediate attention. Frequent occurrence of drought, excessive rains, cold temperatures, seasonal weather fluctuations, frost and high humidity levels (especially along the coastal areas) in production areas often inhibit the quality of seed production and storage. Lack of adequate infrastructure such as glasshouse and screen house facilities in research institutions also limits the ability of researchers to perform maintenance breeding leading to deterioration of stocks of nucleus seeds from which pre-basic seeds are produced. The existing cold storage facilities at research institutions are also non-functional and/or not reliable. The inconsistencies in annual funding have affected planning process at pre-basic seed production level.

It shall be noted that the amount of seeds produced under different seed classes do not directly correspond to the expected multiplication rate. For instance, even though 90 tons of basic seeds were produced in 2010/11 only about 821.7 tons of certified seeds were produced in 2011/12. Such discrepancies show low seed multiplication rate, stocking, inventorying and delay/gaps in transactions along the seed supply chain. ASA and private seed companies generally plan their seed production based on the amount of seeds produced and distributed/marketed through the previous season; expected area under rice production and requests (orders) from the stakeholders along the rice value chain. Yet, the lack of vibrant market for rice seeds and inconsistent planning process shall also be attributed to the discrepancies in production of seeds of different classes.

The degradation of viability of existing stocks are also due to non-committal requests from private seed companies who request basic seeds but do not always eventually procure them. Hence several of the released rice varieties lose their Distinct Uniformity Standards (DUS) after a few seasons of seed production. This is mainly due to inadequate human capacity for maintenance breeding and production of pre-basic and basic seeds. Lack of adequate skills and knowledge on seed technology (production, processing and storage) of existing staffs remains a major challenge in improving the volume and quality of rice seed production. Some of the experienced staffs present in the national system have already reached retirement ages.

### ***3.2.1. Certified seed level***

#### *3.2.1.1. TOSCI*

At the certified seed level, lack of adherence to standards specified by TOSCI is a major key factor causing deterioration of existing seed lots. The current strength of human resources at TOSCI is not adequate to provide nationwide coverage of inspection. The existing staffs are not adequately trained on verifications of seed samples and post production handling techniques of certified seed production. TOSCI also experiences mobility (transportation) and logistical constraints in field inspection and certification.

#### *3.2.1.2. Private companies*

Lack of adequate skills and knowledge on technological aspects of production, processing and storage is also a common challenge faced by private seed production companies in Tanzania. Furthermore, the agro-dealer networks for seeds lack penetration into all rice growing regions. This affects the accessibility of quality seeds by rice growers in remote areas.

### ***3.2.2. QDS production level***

QDS producers generally rely on traditional seed management practices which include broadcasting, visual selection based on crop stand, seed characteristics, sun drying, and storage techniques using locally available materials. At the QDS production level, inadequate

coordination between TOSCI and district level administrative authorities often create confusions on the field inspection and certification of seed lots. Due to human capacity constraints, TOSCI heavily rely on district-, ward-, and village level authorities who are employed by the local administration for seed inspection and certification. The Subject Matter Specialists and Authorized District Seed Inspectors (ADSI) in the districts who are well equipped with seed production techniques through training and workshops conducted by the Seed Unit/MAFC in collaboration with TOSCI. Organizing refresher courses for those SMS and ADSI shall further improve the efficiency of their performances. WAEOs in-wards and VAEOs who are also engaged in field inspection in villages however lack adequate training on field inspection and certification standards on QDS production. This is mainly due to poor prioritization and planning by districts on monitoring the seed production through inspection; which in turn is caused by insufficient funding at district level. It shall be noted that in all cases, inspection is carried out by TOSCI in collaboration with ADSI.

### 3.3. Supply

The lack of consistent funding for production of pre-basic and basic seed production also affects the supply and availability of rice seeds by end users (farmers). This is in turn due to the lack of reliable projections on demands of rice seeds in the country which could help in the planning process. Inadequate funds for securing the pure parental/source seeds by public institutions affects the timely supply of pre-basic and basic seeds through the supply chain. Since several of the local rice seed companies are still young and at embryonic stages of development, the planning and marketing of rice seeds require availability of market research analyses and data on demand and supply in the various rice production regions.

Seed supply chains face several infrastructure and logistical constraints in seed storage, seed movement (transportation), retail network and marketing capacities. Besides impeding the market penetration in rural rice producing areas, the lack of adequate infrastructure and road networks also affects timely availability of certified and/or quality declared seeds in rice producing areas in established market regions. The lack of timely supply of seeds affects the adoption of quality seeds by those farmers who are already aware of the importance of quality seeds and are willing to buy the certified seeds from the markets.

The present restrictions on marketing of QDS within the ward limits the scopes of supply of quality rice seeds through QDS production system. The packaging materials for QDS are generally inferior in quality and therefore more improvement is needed including strengthened inspection of packaging materials as is being done other certified seeds. This affects market competitiveness of QDS with other certified seeds. On the other hand, the price sensitiveness of rice farmers in buying the seeds has led to supply of counterfeit/fake seeds in the market. Though there are well established rules and regulations of packaging and labeling which among

others include the name and address of the seed dealer; the name of plant species; the malpractices such as adulteration and improper labeling are commonly observed along the supply chain of rice seeds in Tanzania. Such deficiency happens in presence of rules and regulations of packaging and labeling which requires among others the name of variety of the seed; the seed class; lot number; weight of the package be well labeled. However, insufficient human- and technical capacities of TOSCI in inspecting the marketing and distribution of rice seeds could be one the factors propelling the problem. The inability of TOSCI in performing timely inspection and certification of seed lots also often causes considerable delays in supply of rice seeds by private seed producers. In addition to constraints of TOSCI, the inadequacy in infrastructures for storage and transportation of seeds is also affecting the timely supply of seeds in the country.

To a large extent, there is insufficient awareness on 'contract farming' specified under Seed Act and Seed regulations. The micro- and macro finance institutions presently are not encouraged to provide finance to seed producers owing to the perceived risks, higher interest rates, collateral restrictions, and poor fiscal performances of private seed companies in the past. The poor ability of private seed producers in accessing finance from public- and private banks in turn affects their ability to pay contract farmers on a timely fashion leading to poor timeliness in the delivery and availability of rice seeds in the markets. Delays in collection of sales money from agro-dealers and the associated subsidy from government by the suppliers also affect the financial plans of private seed companies and seed producers.

There is also a lack of interface that can provide strong linkages between the producers engaged in rice seed production and distribution and seed users in the country. Although the district rice forums provide a general platform for all rice related activities, it is not specific enough to mediate meaningful dialogues between public- and private entities engaged in rice seed production and supply. While TASTA provides a platform for registered seed companies, it has not yet effectively brought the public entities on board to have dynamic dialogues on core policies, institutional issues and infrastructural development for rice seed sub-sector.

## **4. Vision and Goals**

### **4.1. Position of Rice Seed Development Plan**

As in the case of other national strategies for agriculture sector related sub-sectors; the position of the development plan will be placed under the relevant overarching strategy papers. Since this development plan is focused on developing rice seeds, it shall come under the purview of National Rice Development Strategy (NRDS), which has already been integrated into Agricultural Sector Development Programs (ASDP).The rice seed development plan will be

positioned within the framework of the National Seed Strategy encompassing all crops that is presently being drafted in Tanzania. Since ASDS reflects the aspirations of the Tanzania Development Vision 2025; the vertical integration of rice seed development plan into the overarching perspectives of national poverty reduction and economic development shall be ensured through the implementation of the proposed rice seed development plan.

#### **4.2. Vision for rice seed sector**

The rice seed development plan envisages “A well-developed production, supply and distribution system of improved rice seed that leads to improved rice productivity and ensuring food security”.

#### **4.3. Goal& Scope**

The goal of the rice seed development plan is to ‘accelerate the transition of rice seed use from farmer-saved seeds to formally certified/quality declared seeds in order to achieve the production targets set under National Rice Development Strategy by 2018’.

The scope of this plan (road map) covers the entire seed value chain – the production, certification, marketing and policies that enable sustainable environment for quality rice seeds in Tanzania.

#### **4.4. Objectives**

The general objective of this plan is to provide thrust to the development of the rice seed production, quality control and supply system. The adoption of formal seeds by farmers will be increased from the current level of 2% to 15% (12% through certified system and 3% through quality declared system) by 2018. The specific objectives of the plan include the following:

1. To improve the technical and human capacities of public rice seed production and distribution system
2. To encourage private sector’s participation in rice seed industry through enabling policies and public-private partnerships
3. To strengthen and embed a strong network of quality declared seed producers in rice production areas under all ecosystems
4. To improve adoption of quality rice seeds through extension services

#### **4.5. Implementation Structure**

Implementation of strategies described in this document requires interventions by the stakeholders along the rice seed value chain. Since the stakeholders of rice seed value chain also play cross-cutting roles of the rice value chain as a whole, the implementation of the rice seed development plan will require coordination of interventions. Therefore, the implementation of the rice seed development plan shall follow the same implementation structure as that of NRDS. The seed working team will provide the necessary technical advices and suggest areas of interventions by developing concept notes. Upon receiving the inputs from the core technical team; the NRDS taskforce will approach the government for putting in

place the appropriate interventions. The government in association with other development partners/agencies shall provide the necessary financial- and technical assistance to the implementation process. While the projects will be executed by the institutions engaged in rice seed value chain (table 2), the implementation of rice seed development strategies will be overseen by the NRDS taskforce.

## **5. Pillars and Specific Actions**

Enhancing the quality and volumes of production and supply of rice seeds require coherent development of activities along the seed value chain. Given the predominance of informal rice seed production and supply in Tanzania, enabling farmers to adopt formal system becomes important for the development of rice seed sub-sector in Tanzania. This forms the underlying principle of the Rice Seed Development Plan.

The approaches described here involve advancement of both the formal- and informal seed production and supply systems. Ensuring the quality and performance of formal seed production through improved inspection and certification services is a key feature of the proposed seed development plan. The approaches shall be broadly classified under the following pillars:

1. Accelerate research and development activities through improved crop improvement, seed production methods/technologies, maintenance breeding and purification of existing varieties and land races
2. Increase the production of pure, good quality pre-basic seeds along the rice seed supply chain
3. Improving the efficiency of seed production and distribution networks of basic seeds of improved rice varieties
4. Create enabling environment for sustainable production and marketing of certified seeds through public institutions and private seed companies
5. Enable the competence of quality declared seed producers in supplying quality rice seeds to farmers
6. Enhance the quality of all seed classes by promoting best practices in seed production, distribution and use
7. Improve the sustainability of rice seed sub-sector through capacity building, market research, conducive policies, regulations and strengthening of certification process

### **5.1. Pillar 1: Research and Development**

Adoption of quality rice seeds hinges on the inherent features that confer productive advantages to farmers. Invigorating research in developing pure seed lots of agronomically

superior and high yielding rice varieties hence represents an important strategic element for improving the rice seed sub sector. The required key functions are (i) to develop new and improved varieties with desirable traits; (ii) to maintain the purity of existing varieties and land races; and (iii) to develop improved seed production technologies and labor saving technologies.

Strengthening of research and development in seed development will require a range of long-term intervention options. These involve building capacities of human- and technical resources. While the total strength of human capacities need to be scaled up by recruiting new staffs, it is also important to enrich the capacities of existing staff through training and/or upgrading of their technical skills. It will be important to conduct maintenance breeding of all released rice varieties and establish strong linkages with regional and international research and development centers. Development of improved varieties through public-private partnerships will also be emphasized under the plan. Research on labor- and cost efficient means of seed production technologies related to mechanization, integrated soil and water management techniques and pest and disease control measures will be intensified.

## **5.2. Pillar 2: Increase the production of pure, good quality pre-basic seeds along the rice seed supply chain**

Since genetic and physical impurities of seed lots get amplified during the seed production cycles, the quality of seeds is greatly influenced by the health and purity levels of pre-basic seed lots. Enhancing the health and purity of the sourced pre-basic seeds hence represents the pivotal pillar for developing rice seed sub-sector. Technical capacities of identifying phenotypic dissimilarities amongst plant populations at early vegetative stages and sorting of seeds during the post harvest stages will be enriched amongst staffs engaged in the production of pre-basic seeds. Improving the infrastructures such as cold storage facilities at institutions where pre-basic seeds are produced shall reduce the degradation of quality of seeds of existing varieties and reduce the physical admixtures of parental lines and pre-basic seed stocks. Emphasis will be made to mobilize routine funding and institute annual planning process for pre-basic seed production.

The objective is to gear both public and private seed producers towards economically viable germplasm resource management, breeding, seed production and successful marketing of their seeds.

## **5.3. Pillar 3: Improving the efficiency of seed production and distribution networks of basic seeds of improved rice varieties**

Efforts need to be undertaken so that the private seed companies and QDS producers can quickly access to basic seeds of all released varieties for seed production. Since rice is a self-pollinated crop, the relative preference of formal versus informal seed supply is determined in part by the technical factors associated with seed production, multiplication, processing and distribution. When compared to grains, the relatively higher cost of seed production and distribution under a scenario where the effective demand for quality seeds is consistently low

requires interventions for improved efficiency of the present systems of production and distribution of basic seeds of rice.

Major interventions in improving the efficiency of seed production and distribution systems will include mapping of effective demand for rice seeds. The current regulations on contract farming that influence seed production by both the public- and private seed producers will be reviewed and improved so as to increase the efficiency of seed production systems and thereby help attain the objectives set under this seed development plan. Irrigation infrastructures that will minimize the impact of climate change and weather fluctuations will be put in place where seed production is competitive and economically viable. Infrastructures required for storage, processing (seed sorting and packaging) and feeder roads in seed production areas shall also improve the timeliness and efficiency of distribution. Improved capacities of storage facilities for ASA shall also improve the timeliness in distribution of basic seeds. Providing linkages between small seed-producing firms with national and international research centers; training and supervising contract seed growers (farmers) in seed production, handling and storage and providing working capital seed producers, distributors and agro-dealers will also be emphasized.

#### **5.4. Pillar 4: Create enabling environment for sustainable production and marketing of certified seeds through public institutions and private seed companies**

Enabling environment for increased and sustainable private sector investment and participation in production and marketing of rice seeds is an important strategic approach for sustainable development of rice seed sub-sector. Under this pillar, attempts will be made to identify and address the constraints in implementation of the seed policies and strategies. Improving quality assurance and marketing practices through TOSCI's functions will form an important approach.

Public-private partnerships in establishing infrastructures such as storage facilities and rural roads shall also increase the efficiency and timeliness of supply of rice seeds in rice producing regions. Access to finance for potential rural entrepreneurs shall be enhanced by promoting specific financial products which shall help investments in seed production, distribution and marketing network of rice seed supply in the country. Reducing the collateral demand for credits offered to private seed producers by the financial institutions and setting softer interest rates and establishing special finance windows that will cover risks, insurance for seed business will be pursued.

Expanding agro-dealer network in to all rice production areas is an important intervention for improving the supply and marketing of quality rice seeds, especially certified seed. Creating awareness, improving the demand, and increasing the access to microfinance represent major approaches through which agro-dealer network shall be expanded. Building the capacity of seed producers and agro-dealers through training and dissemination of technical knowledge on varietal features and technological innovations will be emphasized. Training on seed business

management skills and creating awareness on financial products and markets for such rural entrepreneurs shall also help enhance the adoption of quality seeds by farmers.

### **5.5. Pillar 5: Enable the competence of quality declared seed producers in supplying quality rice seeds to farmers**

Enabling the competence and widening the scopes of public and private producers of quality declared seeds are important for the sustainability of seed systems in Tanzania. Under this pillar, the entrepreneurial capacity of QDS producers will be strengthened so as to improve their access to farm inputs, irrigation infrastructure, extension services, finance, and seed markets in their respective wards. Improved coordination between extension agents, local governments and district planning committees under DADPs shall help prioritize seed access under the annual plans of local government authorities (LGA); and help increase the supply of community based QDS production through LGA. Collaborative management of seed plans between villages and wards shall also help synchronize the production, marketing and timeliness of supply and marketing of QDS.

The current restrictions on the movement of QDS within ward will need to be relaxed so as to broaden the supply of quality rice seeds across the wards under the QDS system. Expanding the reach of marketing of QDS by relaxing the current restrictions (currently distribution within ward) shall also significantly increase the supply of seeds and help expand the area under rice cultivation as envisaged under NRDS. The recognition of differences between paddy grains and QDS by local authorities will need to be improved to avoid controversies and application of additional tax/cess on seeds during movement of seeds within the country.

### **5.6. Pillar 6: Enhance the quality of all seed classes by promoting best practices in seed production, distribution and use**

Providing extension support to farmers, farmer groups, QDS producers and private seed companies in employing proven good practices along the value chain can have a significant impact in adoption of quality rice seeds. Raising the effective demand for quality rice seeds amongst the farmers is the underlying objective of this pillar. The impact of using quality seeds could be substantially higher if good agronomic practices are followed during the production, post handling by the producers and during utilization of seeds by the seed users. It is conceivable therefore that the increased visibility of impacts shall lead to increased adoption of quality seeds by rice farmers. Promotion of best seed production and seed use practices may work well in areas where advanced agricultural technologies such as mechanization are already adopted.

Through extension services, best practices in seed production and distribution will be promoted. Training of farmers and creating awareness amongst farmers who are presently practicing recycling of grains will be the prime intervention under this strategic pillar.

Demonstrating the socio-economic advantages of using quality rice seeds instead of farmer saved grains through such extension approaches as farmer field school, field days, seed fair, agricultural shows, farmers' education publishing unit and multi-media will be pursued. While the focus of these interventions are to facilitate a technical change in seed production, seed distribution and seed use, various extension methods will be employed in achieving the objective of increasing the adoption of quality seeds by rice farmers. Periodic group training and mass communications through multi media will aim at enhancing the impacts of the use of quality seeds.

### **5.7. Pillar 7: Improve the sustainability of rice seed sub-sector through capacity building, market research, conducive policies, regulations and strengthening of certification process**

Sustainability of formal rice seed system will depend on the impacts that the quality seeds could generate amongst rice producers. Hence sustainable development of rice seed sector shall involve several cross-cutting activities along the value chain. Under this pillar, analytical research on national and regional market dynamics of demand is proposed as a major intervention. Establishing reliable qualitative and quantitative information on market demand, supply and accessibility of rice seeds shall help public institutions and private companies anticipate and respond to the markets in a timely fashion. Market research shall also help identify issues and challenges faced by the stakeholders along the seed value chain and appropriately address the constraints through regulatory and policy tools.

Safeguarding the purity of seeds needs to be administered at production and post production levels of all seed classes. Ensuring health factors such as presence of seed-borne disease, vigor of the seed, and uniformity in seed size on the other hand require rigorous inspection and testing protocols in place. Constant renewal of stocks of all registered varieties (on a routine basis) through proper planning mechanisms at the institute will be emphasized at all levels (pre-basic, basic, certified and QDS) of seed production in order to ensure the availability of seeds along the supply chain. Setting storage infrastructures through public-private partnership (PPP) in strategically viable areas will be explored under the proposed rice seed development plan for Tanzania. Presently the paddy Warehouse Receipt System (WRS) in Tanzania is almost exclusively focused on grain storage. The usage of such warehouse infrastructures shall be extended for storing certified seeds and QDS through PPP arrangements.

Enriching human capacity through fresh recruitments and technical capacity building of existing staffs form a core intervention to increase seed production and inspection capabilities in Tanzania. Special focus shall be paid to replace the about to-be-retired staffs who are presently engaged in pre-basic and basic seed production in public institutions. Providing a specializing option for existing rice researchers who are also responsible for production of seeds of other crops shall improve the efficiency of maintenance breeding activities and pre-basic and basic seed production. Furthermore, technical backstopping by TOSCI inspectors for decentralized inspection and extension bodies (authorized seed inspectors, SMSs, WAEOs and VAEOs),

internal quality control units of private seed companies and QDS producers will aim at improving the quality of rice seed production.

Increased inspection and monitoring of marketing practices by seed producers will hold the key in ensuring quality of seeds. The means of transportation will also need to be scaled up in order to cover the various parts in which rice seeds are produced and distributed. Upgrading of the seed testing laboratory so as to meet the standards set by OECD and ISTA will improve the prospects of regional- and international seed trade for Tanzania based rice seed production companies. Establishing new seed laboratories in all rice producing zones will improve the timely access by producers. Enhancing capacities of inspectors through effective utilization of local government authorities and internal seed quality control units of seed producing companies will become paramount in eradicating fake/counterfeit seeds from the markets. Strengthening the farmers' feedback system through TOSCI on the quality of seeds sold in the markets will also be emphasized.

## **5.8. Target Setting and Gap Identification**

### **5.8.1. Production Target**

Tanzania's NRDS aims to produce 1,963,000 tons of milled rice by the year 2018. The current national average yields obtained by rice farmers from across the different ecosystems are 2.2t/Ha. Since Tanzania's rice farmers use an average of 45Kg of seeds per hectare; a seed-grain ratio of 1:49 is observed. Assuming that all the farmers adopt formal seed production system, this would imply that about 61,633 tons of certified seeds would be required to produce the paddy target set under the NRDS. However, since only about 2% of the rice farmers presently use seeds supplied from the certified/QDS system; a modest target of covering 15% (12% under certified seed system and 3% under quality declared system) is set as a target under the plan. The rice farmers who use seeds supplied through formal production systems are said to renew their seed stocks once in every 4 years. Therefore, in order to cover 15% of rice production under formal seed production system, the country would be required to produce 9,245 tons of certified/QDS by 2018 (table 11).

Table 11: Targets set under the rice seed development plan

NRDS target production by 2018 is <u>1,963,000 of milled rice</u> by 2018 MT		
Seed grain ratios (average for the different varieties in different ecosystems):- On-farm level = 1:49, For certified seed production from basic seeds = 1:81, For basic seed production from pre-basic seed = 1:94		
ASA (2010) data:- certified seed = 950 tons; and QDS = 107 tons; National paddy production (2012/13) = 1,800,551 tons of paddy were produced from 799,361 Ha [@ 2.2 tons/Ha average yield] At a seed rate of 45 Kg/Ha; 1,119,320 Ha would have required 50,369.4 tons of seeds Certified seed usage therefore = $950/50369.4 \times 100 = 1.79\%$ QDS usage = $107/50369.4 \times 100 = 0.212\%$ Total formal seed usage portion = $(1.79\% + 0.212\%) = 2.0\%$ Self supplied seeds = $50369.4 - (950 + 107) = 49,312$ tons (98%)		
Target amount of production to be covered by certified/QD seeds <u>by 2018 = 15 %</u> (Certified seed = 12% and QDS = 3%) Targeted (rice) paddy production under NRDS: $1,963,000 \text{ tons} / 0.65 = 3,020,000$ tons (paddy) Required volumes of seed for paddy production: $3,020,000 \text{ tons} / 49 = 61,633$ tons (seed)		
<u>Seeds in the hands of the targeted 15% farmers are renewed over every 4 years</u>		
	Target amount (MT/year)	Area of land required for production (Ha)
Pre-basic Seed	=114 tons/94 @1:94 seed multiplication ratio =1.213 tons of pre-basic seeds	Seed yield = 3.5 t/Ha $(3,500 \text{ Kg} / 37.05 \text{ Kg} = 1:94.46 = 1:94)$ =1.213/3.5 =0.347 Ha
Basic Seed	=(7396+1849) = 9245 tons of CS/QDS Seed rate= 15 Kg/acre*2.47 =37.05 Kg/Ha @1:81 seed multiplication ratio = 9245/81 =114.135 =114 tons of basic seeds	Seed yield = 3.0 t/Ha $(3,000 \text{ Kg} / 37.05 \text{ Kg} = 1:80.9 = 1:81)$ =114/3 =38 Ha =38 Ha
Certified Seed (12%)	=1,963,000 tons (milled rice)*100/65 *12% =235,560*100/65 tons of paddy =362,400 tons of paddy @1:49 (2.2 tons from 45 Kg/Ha) on-farm seed grain ratio =362,400/49 =7,395.92 =7,396 tons of CS	@ 2.5 t/Ha $(2,500 \text{ Kg} / 45 \text{ Kg} = 1:55.5 = 1:56)$ =7,396 tons of CS/2.5 =2,958.4 Ha =2,958 Ha
Quality Declared Seed (3%)	=1,963,000*3% =58,890 tons of milled rice =58,890*100/65 tons of paddy =90,600 tons of paddy @1:49 (2.2 tons from 45 Kg/Ha) on-	@ 2.2 t/Ha $(2,200 \text{ Kg} / 45 \text{ Kg} = 1:48.8 = 1:49)$ =1,849 tons /2.2 =749.09 Ha =749 Ha

	farm seed grain ratio =1,848.98 =1,849 tons of QDS	
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Using a standard national average seed yield levels of 2.2t/ Ha, the area required to produce the targeted seed production shall also be calculated. The current levels of pre-basic, basic and certified seed production however are below the expected level of production by 2018. There are also gaps in area required for the targeted seed production at all levels. The gaps in volumes that need to be filled to achieve the targeted annual production for the various types of seeds are shown in table 12.

Table 12: Gaps in volumes of seed production

	Target amount (MT/year)	Current (2012-13) Production/ supply (MT/year)	Gap (MT/year)
Pre-Basic Seed	=1.2 tons	= 0.9 tons	0.3
Basic Seed	=114 tons	= 1.2 tons	112.8
Certified Seed, Quality Declared Seed	=9,245 tons	= 816 tons	8,429

The areas that will be required for the various popular rice cultivars that are targeted under the proposed seed development plan are shown in table 13.

Table 13: Target annual production and area required for the production for the various rice cultivars

Name of Seed Producing Stations	Name of recommended varieties	Pre-basic Seed (MT/year)	Areas required for production (Ha)	Basic Seed (MT/year)	Areas required for production (Ha)
Katrin	Supa India (100%)	0.364	0.104	34.24	11.41
	NERICA 1 (100%)	0.097	0.028	9.131	3.044
	NERICA 4 (50%)	0.0486	0.0139	4.565	1.522
	NERICA 7 (50%)	0.0486	0.0139	4.565	1.522
Dakawa	TXD 306 (100%)	0.486	0.139	45.654	15.218
	NERICA 4 (50%)	0.0486	0.0139	4.565	1.522
	NERICA 7	0.0486	0.0139	4.565	1.522

	(50%)			
Total		1.1414		107.285

Purification and multiplication popular land races of rice such as Mbawa, Mbili, Tule na bwana be added to the above set targets on an *ad hoc* basis.

### 5.8.2. Required Human Resources

The current human capacity engaged in seed production and inspection however is far less adequate to achieve the targeted levels of pre-basic, basic and certified rice seed production. Hence capacity building is an important component of the proposed plan.

#### 5.2.2.1. Researchers

Table 14 shows the new recruitments for producing the required levels of pre-basic and basic seeds. It is assumed that the human capacities for certified seeds and QDS will be addressed by the private seed companies and registered seed producers themselves.

Table 14: Required human resources and gap to be filled

	Number of technical personnel to be newly employed	Required Budget For employment
Researchers	= 3 (Dakawa) + 2 (Katrin)	= 5 persons x 12 months x 2million/1600 = 75,000 USD (Recurring)
Technicians	= 6 (Dakawa) + 4 (Katrin)	= 10 persons x 12 months x 1.2 million/1600 = 90,000 USD (Recurring)
Workers/ Laborers	= 20 (Dakawa) + 15 (Katrin)	= 35 persons x 50 days x 2 seasons x 3500/1600 =7,657 USD (Recurring)
Total		172,657 USD (Recurring)

#### 5.8.2.2. Inspectors

As in the case of production, there is also a need for building capacity at inspection level. Presently TOSCI has a total of 25 technical staff involved in seed inspection and certification that covers all crops and are scattered in central, northern, southern highland and lake zones. In addition, 6 staffs from the seed unit -of MAFC play an overall supervisory role for all the seed crops. The estimated gap in human capacities that are required to supervise the targeted production is shown in table 15.

Table 15: Gaps in human capacities of seed inspection

Geographical area	Number of Inspectors		Gap in Capacity
	Required	Available	
Whole Country	= 47 (TOSCI) + 10 (SU/MAFC)	= 25 (TOSCI) + 6 SU/MAFC)	=22 (TOSCI) + 4 (SU/MAFC)

Total	57	33	24
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The existing staffs at TOSCI and Seed Unit of MAFC require training on seed production technologies and seed inspection procedures. The technical gaps of the existing staffs are shown in table 16.

*Table 16: Technical gaps and the budget required to fill the gaps in seed inspection*

Geographical area	Number of inspectors to be newly employed	Required Budget For employment	Number of Inspectors to be trained	Areas for Training	Required Budget for training
Whole Country	20 (TOSCI)	=90,000 USD (recurring)	=20 new + 10 existing (TOSCI)	Seed technology	= 30 x 2500 = 75,000 USD (TOSCI)
	4 (SU/MAFC)	=18,000 USD (recurring)	= 4 new + 6 existing (SU/MAFC)	Seed technology	=10 x 2500 =25,000 USD (SU/MAFC)
Total	24	108,000 USD	40		100,000 USD

## 5.9. Intervention Options

### Variety development and maintenance

- Purification of popular land races of rice in Tanzania
- Collection and characterization of local land races
- Breeding and selection of high yielding rice varieties with desirable traits such as drought tolerance, salt tolerance, RYMV resistance and consumer preferred traits
- Technical and human capacity building for improved varietal development and maintenance activities

### Pre-basic

- Capacity building to address constraints in production of pre-basic seed by Research Institutions
  - training for breeders and technicians on pre-basic seed production and handling
  - Upgrading of Infrastructures
    - Cold storage facilities
    - Irrigation structures for pre-basic seed production
  - glass house, screen house for improving the quality and quantity of seeds produced

### Basic

- Private companies be allowed to directly procure pre-basic seeds from research institutions for basic seed production

- Capacity building to address constraints in production of basic seeds by ASA and registered private companies
  - Training on seed production technologies and internal quality control for private companies and public institutions
- Public-private partnerships allowing private companies to produce basic seeds and TOSCI to conduct pre-control tests under irrigation schemes

#### Certified

- Producing and disseminating manuals and protocols on ‘standard rice seed agronomic production and management practices’ for certified seed
- Provision of training for private seed companies, public institutions and extension agents on seed production technologies through a cost-sharing mechanism
- Setting up of sub-offices of ASA at zonal level and contract the distribution services through private agencies to improve the timely delivery of basic seeds through agencies/contractors Increase the human resources and technical capacities of TOSCI in carrying out timely inspection and certification processes
  - Recruitment of new staffs to cover all rice seed producing areas
  - Training of existing TOSCI inspectors and authorized seed inspectors
- Improve the seed testing and transportation infrastructures for TOSCI and authorized seed inspectors in rice seed producing areas

#### QDS

- Outsourcing of field inspection and seed testing to private entities – contracting out the responsibilities of quarantine and quality control to private and/or public institutions who are positioned across the country e.g. Societe Generale de Surveillance (SGS) and Customs associates in regulating the movement of seeds both within and outside the country
- Capacity building for inspecting seed production, seed packages and marketing by TOSCI
  - Training of inspectors, authorized seed inspectors, subject matter specialists (SMSs) and extension agents on QDS production
  - Improved accessibility to QDS production areas through transportation
- Improving TOSCI’s capacity in monitoring and evaluation of authorized seed inspectors, SMSs and extension agents
- Producing and disseminating manuals and protocols on ‘standard rice seed agronomic production and management practices’ for QDS
- Improved planning (through prioritization) and funding for seed production and inspection at district-, ward- and village levels through annual DADP plans – Sensitization of local political authorities (councilors) at ward and district levels to create awareness on quality seed (certified and QDS) and its role in improving productivity
- Capacity building on QDS production and services
  - Training for district level subject matter specialists, authorized district seed inspectors, ward agricultural extension officers, village agricultural extension officers on seed production technologies, field inspection and quality control

- Provision of training for QDS producers on seed production technologies through a cost-sharing mechanism
- Training of trainers (ToT) program for SMS, ADSIs, WAEOs and VAEOs and other extension staffs of non-governmental organizations

#### Promotion of farmers' adoption

- Periodical training and awareness creation programs for farmers through such extension methods as demonstration plots, farmer field schools, field days, and exchange visits
- Demonstrations of synergistic interactions between good quality seed and other farm inputs such as fertilizers, machineries and agro-chemicals in raising productivity
- Partnerships between local government and private companies and NGOs in creating awareness on the importance of quality seeds amongst rice farmers
- Engaging farmers' organizations (groups, associations and cooperatives) as entry points for seed promotional activities
- Enhancing effective demand for seeds through demonstrations, field days, agricultural shows, seed fairs, farmers' education publishing unit and multi-media
- Strengthening linkages between seed producers, rice growers, processors and markets
- Strengthening linkages between farmers, extension agents and researchers

#### Cross-cutting/Common

##### [Policies]

- Formulation of national seed policy
- Formulation of strategic road map for seed sub-sector
- Strengthening of institutional linkages with regional and international rice research and development centers for enhancing the efficiency of technology development and dissemination
- Improving the availability and accessibility of data on imports, exports, production, supply and demand of rice grains so as to improve market orientation of local rice and rice seed production
- Enabling private seed companies to hire/rent public lands for certified rice seed production
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##### [Movement]

- Resolving the variations in rules and regulations between local authorities on regulations on movement of seeds within the country (mostly for Certified seed and QDS)
- Emphasis on the importance of having TOSCI's certification (transport order) on seed movements within the country (across districts)

##### [Packaging, labeling]

- Enhancing the quality and costs of packaging
- Encouraging smaller (1 to 5 Kg) rice seed packages to increase the uptake of quality seeds by smallholder farmers and early adaptors

[Finance]

- Providing Line of credit for private seed producers through special financial window by reducing collateral demands and providing soft interest rates so as to improve the access to finance by seed producers

[Planning]

- Establishing clear and reliable projections on effective demand through surveys and need assessment studies
- Increasing the annual budget allocations on production of pre-basic, basic, certified and QDS rice seeds by public institutions and local government authorities
- Improving the planning processes by public and private institutions in producing and/or procuring seeds

## 6. Attachments

### 6.1. Rice related projects and programs in Tanzania

### 6.2. Working Tool