



# Trans-SEC

Innovating pro-poor Strategies to safeguard Food Security using Technology and Knowledge Transfer

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<b>Report on the inventory of upgrading strategies among Tanzanian food value chains</b>	
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## **ABBREVIATION AND ACRONYMS**

ASA	Agricultural Seed Agency
ASDP	Agriculture Sector Development Program
BRN	Big Results Now
CEZOSOPA	Central Zone Sunflower Oil Processors Association
CSS	Case Study Sites
DAICO	District Agriculture, Irrigation and Cooperatives Officer
FGDs	Focus Group Discussions
FS	Food Security
FVCs	Food Value Chains
FVCCs	Food Value Chain Components
MCC	Milk Collection Centers
MVIWATA	MtandaowaVikundivyaWakulima Tanzania
NAIVS	National Agricultural Input Voucher Scheme
SPS	Sanitary and Phytosanitary
TBL	Tanzania Breweries Limited
TOSCI	Tanzania Official Seed Certification Institute
UNIDO	United Nations Industrial Development Organization
UPS	Upgrading Strategies
WRS	Warehouse Receipt System

## **1.0 INTRODUCTION**

Participatory situation analysis of existing food value chains (FVCs) has been done by screening and identifying those FVCs that are impacting food insecure households in the target region. This helps assessing good practices of linking food insecure households to the market as well as revealing intervention failures. Suitable examples for upgrading the value chain for the target groups have been developed in the participatory stakeholder involvement in different levels from local to national scale.

Using a highly participatory process, FVCs have been quickly mapped in the Case Study Sites (CSS), drafts of an inventory with potential upgrading strategies (UPS) have been prepared and finally prioritized at the local, district, regional and national level. At this initial stage, given FVCs sub-sectors/crops selected with CSS stakeholders; other criteria were used to give weight based on the type of impact such as impact on food security, poverty and sustainability and impact on structure of the chain. These aimed on consolidating FVCs selection process with another system of quantification hence verifying level of compliance of the particular commodity given criteria.

The UPS are related for instance to 1) resources conservation (soil, water, nutrients), 2) use of production inputs (technical devices, fertilizers, animal feed, seeds and plants, pest control, energy, labour), 3) site-adapted cropping and harvesting, 4) animal husbandry, 5) agro-forestry integration, 6) food storage methods, 7) market access and related price building, 8) safety and quality of food, and 9) consumption and dietary patterns. The results of the exercises have been so far utilized to prioritize potential value chain UPS and complement their ex-ante impact assessments. It has been anticipated that these strategies will then be adapted to the local needs of food insecure households to sustainably improve their livelihoods.

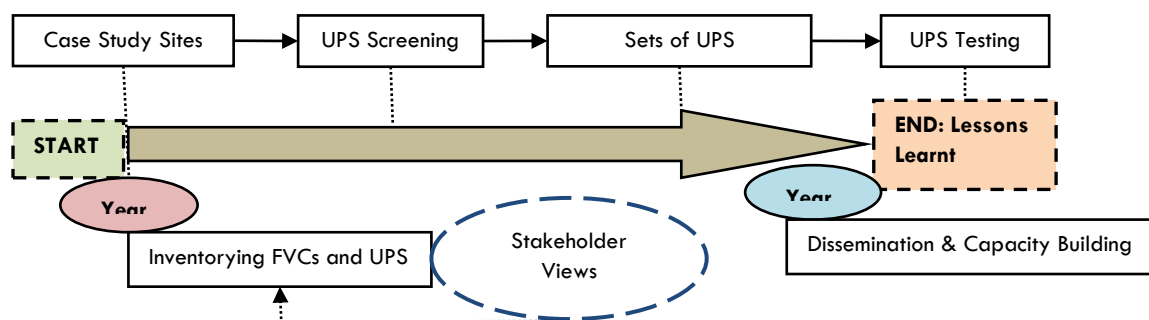
## **2.0 OUTLINING FIELDWORK AND METHODS**

### ***2.1 Context, Level and Themes Overview***

This work was carried out in the frame of a collaborative research project (Trans-SEC – Innovating Strategies to safeguard Food Security using Technology and Knowledge Transfer: A people-centred Approach). Trans-SEC has been designed to identify successful food securing UPS along local and regional FVCs, test and adjust them to site-specific, sustainable settings and tailor these concepts to be disseminated for national outreach. Before the next step of subjecting promising UPS with in-depth analysis and test, this summary report attempts to show UPS inventory as they have been identified among main sub-sectors given FVC components importance in different scales such as local, district, regional and national.

In this light and as explained by Graef *et al.* (2014), the project scientists had already specified and select a set of 3-5 UPS per FVC component, and subsequently the stakeholders selected most promising UPS per FVC component at each CSS for more in-depth analysis and tests. Also, various discussions and assessments would be done involving a wide range of partners and stakeholders to come up with suggestions for adaptations. Thus, the use of models simulations given

environmental and socio-economic conditions, most successful UPS among FVC components would be disseminated through a German-Tanzania network of stakeholder organizations at policy, extension and farmer school levels (Fig. 1).



**Figure 1: Simplified Steps of Food Value Chain Spatio-temporal Research Design** (modified from Graef *et al.* (2014))

## 2.2 Data Collection Overview

We used mainly focus group discussions (FGDs) to get required data and information from stakeholders comprising men, women and youth. For instance in the local scale, one FGD comprised 14-16 members with different professions and functions who were randomly selected from a respective village within Morogoro and Dodoma regions. Whereby, a total of 16 farmers, 10 traders, 6 processors and 4 millers were involved in the FGDs. Discussions which were held for 5-6 hours per village were also guided by a checklist of key points to cover the major components of types of data required. The approach and the tools used were pre-tested for assuring their validity and reliability.

**Table 1: District Food Systems Characteristics**

Feature	Kilosa district – Morogoro region	Chamwino district – Dodoma region
Food systems	Based on maize, sorghum, legumes, rice and horticulture	Based on sorghum and millet
Food security	Both food-insecure and food-secure areas	Sensitive to food insecurity
Highland	Flat plains, highlands and more diverse dry alluvial valleys	Flat plains and small hills
Livestock	Partly with livestock	Deep attachment to livestock
Climate	Predominantly sub-humid (600 – 800mm)	Semi-arid (350 – 500mm)
Markets	Weak and good market access	Weak and good market access
Productivity	Low to high	Low to medium
Land pressure	High	Medium and high

**Source:** Mutabazi (2013) and Graef *et al.* (2014)

Moreover, inventory of higher level UPS has been done for the period of May and June 2014. Mainly, key informant interview was used to gather necessary information and potential stakeholders at district, regional and national levels were major targets. Also, focus group discussions conducted with some of stakeholders at the district and regional level. However, discussions were general considering priority crops or subsectors at the respective level. Table 2 shows coverage of respondents and/or institutions. We also screened existing reports and literature for UPS information to establish an UPS inventory structured as database (Annex 1).

**Table 2: Higher Level Stakeholder Coverage**

Institution/Office/Person	Activity	Number				
		Districts		Regions		National
		Kilosa	Chamwino	Morogoro	Dodoma	
District Agricultural, Irrigation and Cooperatives Officer (DAICO)	Crops, nutrition, cooperatives, farm inputs and land use	5	4			
Trade Officer	Trade and marketing	1	1			
Regional Agricultural Advisors and Cooperatives	Agricultural activities and cooperatives			4	3	
Ministry of Agriculture, Food Security and Cooperatives	Crop research			1	1	2
Ministry of Industry and Trade	Trade and Marketing					3
Other Key informants	Processing; land; manufacturing	1	1	1	2	1
MVIWATA						1

### **2.3 Local Food Security Definition and Sub-Sector Selection**

FVCs components have been quickly mapped in the CSS, an inventory of potential UPS have been prepared and finally prioritized from local to national level. At the initial stage, given FVCs sub-sectors/crops were selected with CSS stakeholders. Criteria were used to give weight based assessments on the type of impact such as on food security, poverty and sustainability and impact on structure of the chain (Annex 2 and 3). As local definitions and criteria of FS to the great extent rely on food availability (Table 3), and given their weights attached to crop/sub-sectors, the discussion of the paper focuses much on Maize and Millet for Morogoro and Dodoma regions respectively (Annex 2 and 3). Food availability is probably key component of food security (FS) as far as Tanzanian government recently reported to struggle balancing food availability given food market prices (Haug and Hella, 2013). Thus, UPS inventory has been prepared based on views of experts and other potential stakeholders.

**Table 3: Local Definitions of Food Security**

MOROGORO		DODOMA	
CHANGARAWAWE	ILAKALA	ILOLO	IDIFU
Enough food	Reserving food for later use	Having reliable 3 meals (for current and future use)	Best storage of food and use insecticide in storage
Food storage/reserve	Making sure there is food whenever it is needed	Store food per annum	Enough food
Surplus production		Store and use food properly	Food reserve
Enough food for the week/month/year	Best storage of food for current and later use	Store food maintaining its quality i.e. free from pests and diseases	Good harvest cycles
			Best use of food year round
<b>CSS Stakeholder Consensus</b>			
Generally, enough food year round	A family should be assured to have enough food all year round and be best used	Assured of getting 3 meals on daily basis and food should be stored safely free from microorganisms	Enough food well stored (using insecticides) to be used all year-long

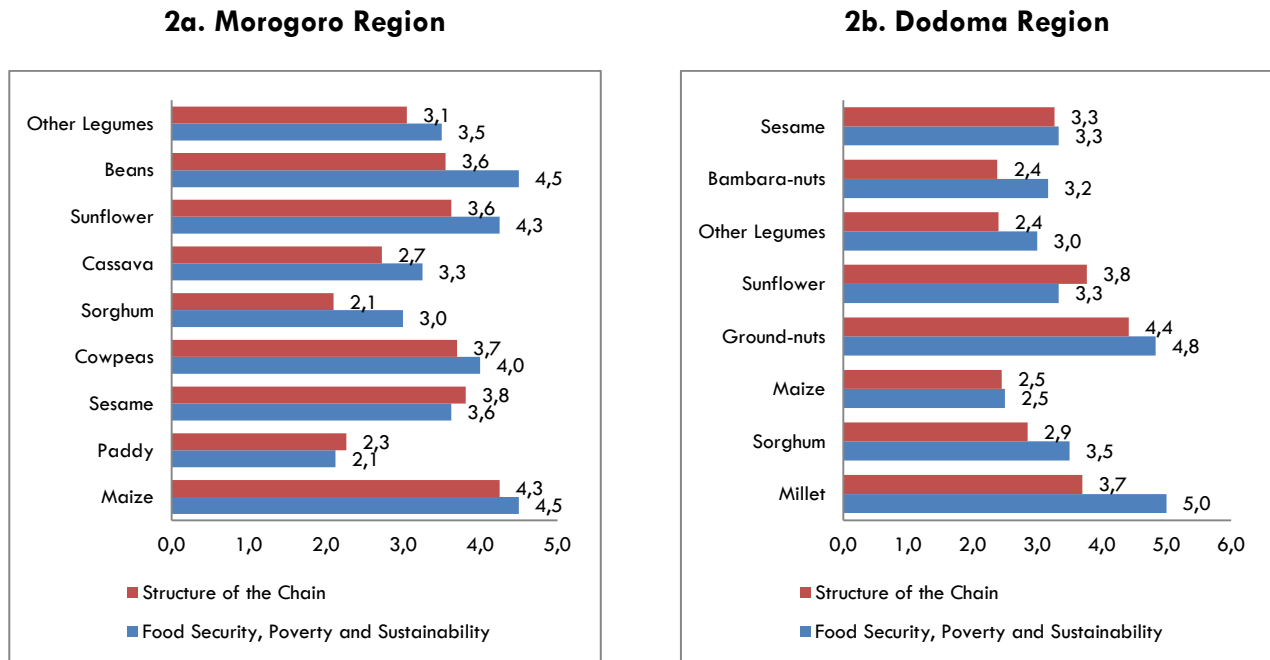
## **2.4 Local Stakeholders Main Crops Scores Based on Impacts**

Local stakeholders in Morogoro and Dodoma regions through their groups gather numeric scores for main crops which are grown in their villages then simple averages made (Fig. 2). According to Sanogo (2010), this is very important step which used to check the way FVC conforms to the criteria developed. In this regard, we have used two types of impacts such as FS, poverty and sustainability and structure of the chain. Whereby, scores have been attached to a number of criteria under these main impacts. For instance, criteria which are under FS, poverty and sustainability are direct contribution to FS, future potential of the crop, number of poor household involved in the sector and availability of natural resources; and those which are under structure of the chain are extent of value adding potential (stability, profitability), number of different products produced, length of marketing chain (number of intermediaries), marketing potential and potential for lessons learnt/replication mechanism (see Annex 2 and 3). These have been developed to add value on UPS selection process given main crops and/or sub-sectors.

The assessment was done to both consumption or market oriented FVCs (Fig. 2). Based on local definitions of FS, we have to consider crops/sub-sectors from regions with high possibility of increasing food availability hence observe highest score on FS, poverty and sustainability impact. In Dodoma region millet scored 5.0 out of 5.0 hence being selected (Fig. 2b). While, in Morogoro region the highest score of 4.5 revealed on maize and beans crops (Fig. 2a). In this regard, we have to consider an overall average after combining with other impact scores such as structure of the chain. Whereby, maize has the highest average score of 4.3 out of 5.0 followed by sesame



which scored 3.8 out of 5.0 (Annex 3) hence beans were dropped. Thus, maize and millet represent main crops in Morogoro and Dodoma regions, respectively, with higher chance of securing food in rural areas of these regions. Moreover, other crops can be taken on board given their scores, market and regional potentiality etc. These crops are sesame and sunflower for Morogoro and Dodoma respectively.



**Figure 2: Average Local Stakeholders Crops Scores Based on Impacts**

Note: A score of 1 meaning that the particular commodity did not meet that criteria (minimum compliance), and a score of 5 meaning that the commodity best met that criteria (maximum compliance)

### 3.0 UPS SELECTION AND INVENTORY

#### 3.1 Local Level UPS Selection

At the local level, food commodities were grouped as consumption and market oriented food value chain components (FVCCs). Whereby, local ranking criteria for consumption and market oriented commodity was based on the number of household depend on the food crop (%) and the producer price respectively. Alongside these, few remarks and unique features were noted particularly for commodities with high interest to stakeholders' livelihood. As mentioned above, the local ranking of food commodities has been presented per village (Table 4, 6, 8 & 10). Thus, for the purpose of this summary report, we have also presented prioritization of UPS per village for major crops such as Maize and Sesame in Morogoro and Millet and Sunflower/Groundnut in Dodoma (Table 5, 7, 9 & 11).

**Table 4: Local Ranking of Food Commodities - CHANGARAWE**

S/N	Commodity	Rank	HH depend on the crop (%) OR producer price (Tsh)	Remarks/ uniqueness
<b>Consumption oriented FVCCs</b>				
1	Maize	1	100	Its production is easiest in the area/ can also be a commercial crop
2	Paddy	2	75	Celebratory food
3	Sorghum			
4	Cassava	3	50	
5	Sweet potatoes			
6	Legumes-“kunde”	5	80	
7	Pigeon peas			
8	Beans	4	100	Main adjunct to staple food
<b>Market oriented FVCCs</b>				
1	Cowpeas-“Mbaazi”	2	60,000/bag	5 bags/acre [few handling complications also consumed while green, sold afterwards]
2	Sesame	1	270,000/bag	3 bags/acre
3	Sunflower	3		Losses caused by predator i.e. birds

**Table 5: Prioritization of Upgrading Strategies (UPS) for Maize and Sesame - CHANGARAWE**

**>>MAIZE**

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES [ESTATE OWNED LAND]</b>				<b>PRODUCTION</b>			
Low soil fertility	4	Fertilization	3	<b>Seeds:</b>			
Low and erratic rainfall	2	Irrigation	2	Limited use/knowledge of improved seeds i.e. grading	1	Educate on advantage of using improved seeds and grading	1
Soil compaction – maasai livestock	3			<b>Planting:</b>			
Insecure land tenure	2	Granting ownership right by the government	1	Pests i.e. “finye”	2	Use of insecticides, pesticides	2
<b>PROCESSING</b>				Do not follow best practice		Follow best practice	
Electricity is very erratic	1	Reliable electricity to reduce processing costs	1	<b>Crop husbandry:</b>			
High processing prices	2			Not using fertilizers		Use of fertilizers	
<b>MARKETING</b>				Various weeds		Authentic weeding and required chemical availability	
Numerous levies (5%)	2	Remove/reduce crops	2	<b>Transportation:</b>			

		levies					
Lack formal markets	1	Presence of physical markets and readily available prices information	1	High district levies			
Middlemen tend to increase prices	4	Improve market information system		<b>Storage:</b>			
Inadequate number of local consumers/lack local market i.e. "gulio"	3	Resume local market system i.e. "gulio"	3	Poor storage hence wastage			
<b>CONSUMPTION</b>				Pests and rats			
Nutrients deteriorate after milling	2	Educate and sensitize	1	<b>Wastes &amp; by products:</b>			
Inadequate dietary knowledge to consumers	1			Livestock invades the grasses	3	Demarcation of range and agricultural land	3
				Maize cobs are used as firewood			

>>SESAME

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES</b>				<b>PRODUCTION</b>			
Inadequate land to cultivate	1	Government intervention	1	<b>Crop husbandry:</b>			
Unpredictable rains	2	Early planting	2	Insects i.e. “viroboto”, “vikoti”, “finye”	1	Use insecticides	1
<b>PROCESSING</b>				Insecticides are very expensive/absence of credits for agric activities	2	Provide credits	3
Unaware of by commodity products	1	Educate/train	1	<b>Harvesting:</b>			
Sell produce at farm gate	2	Have processing machine	2	Theft	3	Farmers control	3
<b>CONSUMPTION</b>							
Time consuming (you need to wash, dry, grid etc)	1						

**Table 6: Local Ranking of Food Commodities - ILAKALA**

S/N	Commodity	Rank	HH depend on the crop (%) OR producer price (Tsh)	Remarks/ uniqueness
<b>Consumption oriented FVCCs</b>				
1	Maize	1	100	Main food crop
2	Paddy	3	75	Rain fed
3	Sorghum	2	50	Drought resistant
4	Cassava	4	40	
5	Sweet potatoes			
6	Pegionpeas			
<b>Market oriented FVCCs</b>				
1	Sesame	1	250,000/bag	3 bags/acre [the market are clear and 100% of HH depend on the crop]
2	Cotton			
3	Cowpeas	3	60,000/bag	3 bags/acre [can be mixed with sesame and other crops; can be sold anytime and majority are depending on the crop]
4	Sunflower	2	30,000/bag	5 bags/acre [shorter maturity time (3months) compared to cowpeas (7months) and 75% of HH depend on the crop]

**Table 7: Prioritization of Upgrading Strategies (UPS) for Maize and Sesame - ILAKALA**

**>>MAIZE**

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES</b>				<b>PRODUCTION</b>			
<b>Land and Soils:</b>				<b>Seeds:</b>			
Livestock keepers invade and compact soils	2	Land use/planning	2	Seed stockists are at district level-distant	2	Stockists should be nearby (Best practice)	2
Soil fertility is waning	3	Availability of fertilizers	3	Local seed types takes long time and few harvests			
<b>Water:</b>				Knowhow on type of seeds is problem			
Drought/erratic rainfall	1	Use of short time seeds varieties	1	<b>Crop husbandry:</b>			
<b>PROCESSING</b>				Various weeds			
Due to stress harvest the maize destruct machines		They should establish organisation	2	Herbicides should be available, use of tractors control weeds than hand hoe farming (best practice)			
Very few millers in	2	They should meet and discuss	3	Stem borers			

thevillage		customer affairs					
Millers should meet and discuss how to control the business better	2	Inspect before milling		<b>Transportation:</b>			
Milling price claimed to be high (Tsh 60/kg)	1	Number of milling machines should be increased	1	Poor roads (not all weather)			
The customer service in milling machines is poor	3	Education on customers care to millers	1	<b>Storage:</b>			
<b>MARKETING</b>				Storage is challenge i.e. insects and pests			
Markets are not reliable		Reliable physical markets/Warehouses/receipt systems should be established	3	<b>Wastes &amp; by products:</b>			
Highly fluctuating prices (volatile)	1	Increased production to enjoy the economies of scale	2	Livestock keepers invades and destruct all the residuals	3	Reduction of livestock herds, Land/use land planning for village land	4,2
Measuring instruments is a problem (Bags vary in size at the same price)	2	Standardized enforcing measuring unit		<b>CONSUMPTION</b>			
High CESS levy	3	Levies/Taxes should be		Consume flour from	3	Increase	3



(1,500/bag)		removed or reduced		early harvest due to food shortage		production and store the surplus	
Roadblocks		Improve road infrastructure	1	Food consumption is twice per day during the active farming activities	1	Education on food consumption and nutrition	1
Imports of related commodities i.e. rice		Monitor importation		Only maize flour used by the majority	2	Change their altitude	2

>>SESAME

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES</b>				<b>PRODUCTION</b>			
Livestock compaction of soils	1	Village land use and planning	1	<b>Seeds:</b>			
<b>PROCESSING</b>				Improved varieties short time but less drought resistant (due to poor practices improved and local varieties yields are the same)	2	Use drought resistance varieties	
No processing firm or value addition activities	1	Have processing firms	1	<b>Planting:</b>			
<b>MARKETING</b>				Planting distance and procedure (Rainfall are	2	Provision of extension services	2

				erratic hence a rush)			
Availability of dirty sesame from farmers	3	Quality control at village level	3	<b>Crop husbandry:</b>			
Middlemen and traders add sand	2	Cooperation along the VC to control quality	2	Insects	1	Use insecticides	1
Unreliable measuring instrument	1	Use of digital weigh-balance	1	Theft	3	Increase farm guards	3
<b>CONSUMPTION</b>				<b>Harvesting:</b>			
Local processing is hard as you need to wash, dry, fry, grind before you use as adjunct in food	1	Have proper technologies	1	Challenge in harvesting during rainfalls and losses due to insects and pests			
Plants are burnt and ashes are used as vegetable tenderizer							

**Table 8: Local Ranking of Food Commodities - IDIFU**

S/N	Commodity	Rank	HH depend on the crop (%) OR producer price (Tsh)	Remarks/ uniqueness
<b>Consumption oriented FVCCs</b>				
1	Millet – Perl	1	100	The most drought resistant and main food crop
2	Sorghum	2	100	
3	Maize	3	30	Could be preferred but it is not drought resistant
4	Cassava			
5	Pegionpeas	4	100	Majority own small plots for the crop/ leaves vegetable besides
<b>Market oriented FVCCs</b>				
1	Groundnuts	1	5,000/debe [April-May]; 8,000/debe [July]	Debe 60-70/acre [100% of households depend from and grow this crop]
2	Sesame		4,000-7,000/debe	Debe 30-35/acre [processing cost - Tsh 1,500/debe if you left waste at the mill gate or pay Tsh 2,000/debe to leave with waste (1debe lead 2 liters)] -80% of HH grow the crop in the village
3	Sunflower	2	8,000-10,000/debe	Very productive (debe 80 – 85/acre) and marketable crop but is labor intensive especially during crop husbandry
4	Bambara nuts	3		

Note: 1 Debe is equivalent to 20 kg

**Table 9: Prioritization of Upgrading Strategies (UPS) for Millet and Sunflower - IDIFU**

**>>MILLET**

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES</b>				<b>PRODUCTION</b>			
Erratic rainfall	1	Short time varieties	2	<b>Seeds:</b>			
Excess water	2	Water tolerant varieties	1	Local cultivars are rampant (though they are aware of improved seeds and are available when needed)	3	Use improved seeds	3
<b>PROCESSING</b>				<b>Planting:</b>			
In milling machines malts are less considered since they do not contaminate the Ugali flour with Malt flour	1	Group customers through queue	1	Planting traditional that's why they do not want improved seeds	1	Apply best practice to realize optimal levels	1
				<b>Crop husbandry:</b>			
				Army worms and other black worms which feeds not only on leaves but also stems			
<b>MARKETING</b>				Birds			
They sell most to Brew makers and sedentary business storing during harvest @5000/- sell	2	Other sources of income, so that they do not do "stress selling"	2	<b>Harvesting:</b>			

back at 12,000/							
Few business men and market are narrow	1	Farmers group/cooperative selling	1	Post harvest losses [1:20 kg ratio]	4	Birds control	
The business men do not negotiate prices (selling or buying)	3	Cereal bank	3	<b>Wastes &amp; by products:</b>			
				Stems are not used for improving soil fertility, slush and burn is sporadic (90% of farmers tend to burn)	2	Education	2
<b>CONSUMPTION</b>							
Sometimes alcohol Ughimbi fail due "lighting"	1						

>>SUNFLOWER

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>PROCESSING</b>				<b>PRODUCTION</b>			
Inadequate number of processors	1	Increase number of processor	1	<b>Crop husbandry:</b>			
Long distance to reach processors	2			Pests and diseases i.e. wild mild dew	3	Use of prays - pesticides	3
<b>MARKETING</b>				Unavailability of pesticides, insecticides and herbicides	2	Availability of farm inputs shops	2
Inadequate external buyers and markets	2	Increase production	1	<b>Harvesting:</b>			
Low production	1			Less produce	1	Proper education provision	1
<b>CONSUMPTION</b>							
Unaware of quality associated issues (especially for sunflower oil)	1	Facilitate linkages with required institutions and experts	1				

**Table 10: Local Ranking of Food Commodities - ILOLO**

S/N	Commodity	Rank	HH depend on the crop (%) OR producer price (Tsh)	Remarks/ uniqueness
<b>Consumption oriented FVCCs</b>				
1	Millet-Perl	1	100	Main food crop
2	Sorghum	2	50	White specie is also preferred as food
3	Maize	4	100	Mixed with other crop flour
4	Cassava	5	20	Eaten direct as food or as part of breakfast
5	Bambara nuts	3	70	Can also be marketed
6	Pegionpeas	6	100	Save as vegetable
<b>Market oriented FVCCs</b>				
1	Groundnuts	1	5,000-6,000/debe	Debe 35/acre [100% of HH depend and grow the crop
2	Sesame	2	2,000/kg	200kg/acre [30% of total HH grow the crop
3	Sunflower	4		
4	Tomato	3	10,000-14,000/debe	Debe 200/acre

Note: 1 Debe is equivalent to 20 kg

**Table 11: Prioritization of Upgrading Strategies (UPS) for Millet and Groundnuts - ILOLO**

**>>MILLET**

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES</b>				<b>PRODUCTION</b>			
Soil fertility has started to diminish	2	Use of (industrial) fertilizers	2	<b>Seeds:</b>			
Mountainous land	3	Extension services and use of ridge	3	Use traditional seeds (of the previous production season)		Use of affordable improved seeds	
Scarcity of land for cultivation	1	Use of small plots more efficiently	1	<b>Planting:</b>			
<b>PROCESSING</b>				Sometimes combine several seeds in one hole without following required practice i.e. use of rope etc		Use of straightening ropes	
Immature and wet millet tend to tear down milling machine	2	Use of "chekeche" with 1.5 size	2	<b>Crop husbandry:</b>			
Mixed up of customers' flour ("uwelenakimea cha pombe")	1	Customer grouping and use of appropriate technology	1	Crop pests and insects i.e. "viwavijeshi" and "mchwa"		Use of pesticides	
<b>MARKETING</b>				Weeds (large farms) -	2	Timely weeding	2



				herbicides are not used			
Inadequate production (mainly for food)	1	Increase productivity	1	Absence of farm inputs shops		Availability of farm inputs shops	
<b>CONSUMPTION</b>				Absence of extension officers	3	Availability of extension officers	3
Have bitter test when milled in bulk	1	Mill small quantity for few days consumption	1	<b>Harvesting:</b>			
				Post harvest losses (0.5 kg out of 20kg) during and after harvest	4	Ontime harvest and better storage of produce	
				Absence of means of transporting produce i.e. tractors etc			
				<b>Waste &amp; by-products</b>			
				Crop residues used to be burnt (90% of farmers burn their millet residue after harvest)	1	Provide education so as they can use it as manure	1

>>GROUNDNUTS

Critical constraint	Rank	UPS	3 important UPS	Critical constraint	Rank	UPS	3 important UPS
<b>NATURAL RESOURCES</b>				<b>PRODUCTION</b>			
Short rainfall lead to poor harvest	1	Early planting	1	<b>Seeds:</b>			
<b>PROCESSING</b>				Poor good seeds selection knowledge	3	Receive proper knowledge	3
Most sell raw	3	Offer technology for value addition	2	<b>Planting:</b>			
Inefficiency of hand shelling machine	1	Availability of modern technology	1	Inadequate planting knowledge	1	Education and extension services on better planting practice	1
Inadequate number of machine (can serve <50% of households in the village)	2	Increase the number of processors	3	<b>Crop husbandry:</b>			
<b>Waste &amp; by-products:</b>				Crop pests i.e. "chawaweupe"and rats		Use of pesticides	
Burn all crop waste after shelling	4	Provision of education		Unavailability of herbicides and pesticides	2	Availability of farm inputs shops	2
<b>MARKETING</b>				<b>CONSUMPTION</b>			
No formal market	3	Availability of market	3	Delayed harvest diminish produce quality i.e. better taste	1	Early harvest and on farm drying	1
Farmers can't negotiate prices	2	Mobilize farmers groups	2				
No market related information	1	Search markets and associated information	1				

## 3.2 Higher Level UPS Selection

### 3.2.1 District Level

**Kilosa:** As a district, Kilosa has limited land (land use planning has been undertaken in 33 villages out of 118) with adequate water bodies. Relatively fertile lands are not part of the villages land; however different crops can be grown under rain-fed condition. The district has also high population of indigenous cattle and many livestock keepers.

- Priority crops at the district level: *paddy, maize; sunflower, beans and onions.*
- Priority livestock and product: *local chicken and indigenous cattle meat.*

#### Other observations

- *Sunflower* is the promising crop at the district level if supported.
- District does not support *sesame* due to its management costs i.e. pesticides etc.
- Stakeholders should be mobilized and sensitized to realize benefits of high valued crops.
- *Local chicken* are supported since they can be nurtured with available feeds with small and manageable capital.
- *One indigenous cattle* can employ and benefit numerous actors (>5) along the chain.
- Some *milk* processors have established their milk collection centers (MCC) within the district such as TANGA Fresh, TAN Dairy and Shambani Graduates.
- All households are consuming and store different types of wild vegetables

#### Natural Resources

##### >Crops

**Constraints**>> Land ownership issues limit farmers to expand and diversify their crops [1]; soil fertility decline affects crops particularly maize [2]; slight conflict between farmers and livestock keepers; overstocking [3]

**UPS**>> Land use planning [1]; crop intensification initiatives i.e. fertilization etc; harvesting of livestock products [2]; training, extension services and sensitization (related to changing farming altitude including growing of off-season crops, crop diversification, cattle fattening, changing animal breeding) [3]

##### >Livestock

**Constraints** >>Improper water use system (upstream – downstream) i.e. shortage in Sept, Oct and Nov [3]; overstocking [2]; absence of specific cattle routes; cattle invasion from other areas i.e. Kongwa, Kiteto and Mvomero; Limited land size (mainly estate owned) [1]

**UPS**>> Water reserves and management [2]; establish pastures [3]; Mobilization on alternative income generating activities [1]; establish auctions

## **Production**

### **>Crops**

**Constraints**>> Use of indigenous technology on land preparation which affect tillage, time spent, off-farm activities [3]; high price of farm inputs such as fertilizer, improved seeds (maize and sesame) [1]; bad practice in farming such as spacing, record keeping, timing on planting and weeding; pests and diseases mainly sesame and beans [2]

**UPS**>> Crop diversification and high valued crops introduction i.e. source of food, income and crop by-products [1]; training and extension services i.e. use of residual moisture, improved seeds, timing on planting and proper application of pesticides [3]; use of animal power; fertilization related innovations [2]; having storage facilities.

### **>Livestock**

**Constraints** >>Inadequate feeds/pastures [2]; limited storage facilities for livestock by-products particularly for milk [1]; inadequate milk production; pests and diseases (transmitted from wild animals) [3]

**UPS**>> Establish MCC with cooling facilities (through farmers' groups) [1]; improve animal breeds [2]; establish cattle dip and vaccination [3]

## **Processing**

### **>Crops**

**Constraints**>> Inadequate supply i.e. sunflower, sesame etc [1]; poor technology i.e. sunflower oil refining, other crops by-products such as maize etc [3]; inadequate package materials; regulations, meeting standards and products branding; limited knowledge i.e. sesame by-products and value chain; inefficient use of crop by-products and waste i.e. from cereals [2]

**UPS** >> Using advance technologies i.e. refining sunflower oil, mobilize sunflower production [2]; having good package materials; capacitate on using of simple technologies and use of crop waste and by-products for cereals, sunflower etc [1]; explore sesame value chain and by-products [3]

### **>Livestock**

**Constraints** >> Inadequate supply of milk [2]; inefficient use of livestock by-products i.e. skin [1]

**UPS** >> Establish MCC [1]; having simple technologies for making skin related products [2]

## **Marketing**

### **>Crops**

**Constraints**>> Limited markets (for both crops and livestock products) [1]; poor market related information system (for all sub-sectors) [3]; lack storage facilities i.e. warehouses [2]

**UPS**>> establish market centers i.e. MCC, auction etc [1]; having market information system capturing all agricultural related commodities [3]; mobilize use and consumption of some commodities such vegetables, milk etc; establish storage related interventions and credit systems [2]

## **Consumption**

### **>Crops**

**Constraints**>> Limited awareness of sesame by-products uses [2]; inadequate knowledge of nutritious food/balance diet [1]; inadequate supply of horticultural commodities particularly vegetables [3]; early harvest of maize affect quality of flour

**UPS**>> Establishment of training program for issues related to food consumption and nutrition [1]; mobilize use and supply of vegetables [2]

### **>Livestock**

**Constraints** >>Poor milk drinking altitude [1]

**UPS** >> Training and mobilization i.e. drinking milk etc [1]

### **Box 1: MSUNGU ENG. WORKS**

Msungu Eng. Works is a unique enterprise based in Dodoma municipal. It is operated by Mr. Majaliwa B. Msungu. It deals with manufacturing of incubators, chick supply (both local and hybrid), hatchery process and manufacturing of other associated machines. The enterprise uses simple technologies which can easily be adapted in rural areas. Moreover, Mr. Msungu has experience of providing related coaching and trainings including the knowledge of various species of local chicken and their suitability given locality. Probably, Trans-SEC can find the way of using these local knowledge and innovations for consolidating some of UPS. For instance, establishing solar power based incubators, facilitate trainings, and combine this into some of UPS such as *integrated rural poultry and crop system* hence sustaining income and food security.

**Chamwino:** The district has a total of 78 villages. Challenge of having proper land use planning since 2006 has been reported to be affected mainly by political reasons and influence. So far,

more than 65% of farmers are using hand hoe and few use animal power. Also, few farmers in 45 villages reported to grow different types of vegetables.

- Priority crops at the district level: *Sorghum, millet, sunflower and groundnuts.*
- Priority livestock and product: *local chicken.*

### **Other observations**

- Few farmers in Mgunga village are selling specific type of *sorghum* (white) to Tanzania Breweries Ltd (TBL)
- Some farmers are also owning *indigenous cattle* and animal power
- Few processors through Central Zone Sunflower Oil Processors Association (CEZOSOPA) acquired land within the district and they will install about 3 oil refining technology. Recently, they are only doing semi-refining after getting grant and technology from UNIDO.

### **Natural Resources**

#### **>Crops & Livestock**

**Constraints**>> Erratic rains and poorly distributed [1]; using unimproved seeds; declining soil fertility and negative perceptions on fertilizer use [2]; poor crop production practice i.e. tillage etc [3]

**UPS**>> Rain water harvest and use of pedal pumps [1]; better use of animal power [3]; use of herbicides and fertilizer [2]; effective land use planning

### **Production**

#### **>Crops & Livestock**

**Constraints**>> Poor planting systems [1]; negative attitude on fertilizer use [2]; local chicken rearing system is not commercialized [3]; diseases for both crops and livestock

**UPS**>> Training and promotion of potential crops i.e. millet; effective implementation of by-laws (farmers should cultivate a total of 5 acres each) [1]; timing on planting, harvesting and use best planting methods [2]; availability of herbicides and vaccines [3]

### **Processing**

#### **>Crops & Livestock**

**Constraints**>> Availability of poor technologies i.e. sell and use unrefined sunflower oil [2]; short length of value chain activities with limited by-products i.e. for sesame, groundnuts etc [1]

**UPS>>** Using technologies i.e. for processing groundnuts [2]; full use of wastes and establish alternative uses i.e. process groundnuts shells, forming animal feeds from cereals waste [1]

### **Marketing**

#### **>Crops & Livestock**

**Constraints>>** Poor backward and forward market linkages [1]; poor packaging material; limited number of by-products [2]; poor storage facilities [3]

**UPS>>** Farmers' groups, good market linkages systems [1]; timing harvesting and storage [2]; trainings [3]

### **Consumption**

#### **>Crops & Livestock**

**Constraints>>** Bad practices i.e. adding produce weight by mixing with sand (*sorghum, millet, sesame and sunflower*) [1]

**UPS>>** Education training and extension i.e. quality issues, diets and nutrition [1]

#### **Box 2: UPS BLENDING**

Using very few farmers with least cost, Dodoma region through Agricultural Advisor tried the related approach of upgrading poor rural households. However, they have selected active poor people in Kongwa and Mpwapwa Districts (about 5 in different villages) and given 1 acre of land to grow sorghum (assisted with seeds and initial plowing), 100 cassava cuttings, 10 tree seedlings and 5 local chickens. They have strong assumption that, uplifting very poor households would make significant change given adoption behaviour of different people in the community. Thus, the lesson learnt from their initiative is the possibility of combining and strengthen related UPS together and have one *full package* of UPS hence address all components of food security concurrently.

### **3.2.2 Regional Level**

**Morogoro:** Is among the productive regions and numerous crops have been grown for decades. Absence of effective land use and planning to most of districts within the region results endless misunderstanding between farmers and livestock keepers and unused fertile land. Despite the potentiality of the region and other initiatives, stunting rate is above the national level.

- Priority crops at the region level: vary from one district to another i.e. Mvomero – *Maize*; Manicipal – *Sunflower*; Kilombero – *Paddy* etc.
- Priority livestock and product: also vary from one district to another Ulanda and Kilombero – *Dairy Cattle*; Municipal – *cattle fattening* etc.

### **Other observations**

- After market liberalization, cooperative societies within the regions were not performing better
- Region is implementing “Mwanzo Bora” nutrition program under “Feed the Future”
- Government support into agricultural activities has been limited at the regional level
- Potential of producing and processing adequate milk in some district such as Ulanda and Kilombero

### **Natural Resources**

#### **>Crops**

**Constraints**>> Unplanned and idle land i.e. affect the use to both farmers and livestock keepers (mainly in Kilombero, Mvomero and Kilosa Districts) [1]; water sources destruction [2]

**UPS**>> Land use and planning [2]; environment management and effective implementation related by-laws [1]

#### **>Livestock**

**Constraints** >>Inadequate ranches to satisfy needs [2]; limited land for pastures [1]

**UPS** >> Commercialize sub-sector [1]; establish pastures [2]

### **Production**

#### **>Crops**

**Constraints**>> Inadequate supply of most of agricultural produce [1]

**UPS**>> Use of improved seeds [2]; fertilization and intensification [1]

#### **>Livestock**

**Constraints** >> Diseases and poor breeds i.e. cattle and local chicken [1]

**UPS** >> Improve livestock breeds [1]; treatments and vaccinations [2]



## **Processing**

### **>Crops**

**Constraints**>> Poor performance of small and medium processors [2]; inadequate production limit supply of inputs to firms [1]

**UPS**>>Light technologies facilitation such as oil pressing, milling, plastic recycling machines etc to small and medium agribusiness firms [1]

### **>Livestock**

**Constraints** >> inadequate MCC and processing plants [1]

**UPS** >> Establish cold chains/MCC [1]; Market linkages [3]; quality milk and meat processing plants [2]

## **Marketing**

### **>Crops**

**Constraints**>> Absence of good market information system [1]; insufficient efforts on market linkages and associated initiatives [3]; fetching low prices during harvest [2]

**UPS**>> Market information system [3]; market linkages and establishment of warehouses, revive auctions [1]; farmers groups for collective actions [2]

### **>Livestock**

**Constraints** >> Poor road infrastructure [1]

**UPS** >> Improve cold chain i.e. Kilombero and Ulanga [1]

## **Consumption**

### **>Crops & Livestock**

**Constraints**>> Stunting rate (average of more than 44%) is above the regional level (34%) [1]

**UPS**>> Mobilize breast feeding for children less than 2 years [2]; community trainings involving key stakeholders at the local level [1]

### **Box 3: Cooperatives and/or Farmers Groups**

So far cooperatives societies within the country are facing different historical challenges. However, good performance of these societies would take place if members are well mobilized and sensitized about cooperatives, and well committed. Moreover, use of *farmers* groups in case study sites would be the best option for testing some of UPS for collective actions. However, we need active groups and probably establishing few new groups which must be carefully sensitized and mobilized throughout the project life time for having pioneered committed members and good group leaders.

**Dodoma:** For having success on interventions related to UPS, some of stakeholders at the regional level believe on full involvement of active poor people. However, close follow-up and participation of all key stakeholders have been mentioned to be one of the important pre-requisite.

- Priority crops at the regional level: *grapes, sorghum; millet, sunflower, and vegetables.*
- Priority livestock and product: *local chicken.*

### **Other observations**

- Limited number of livestock hence little access to adequate amount of farmyard manure
- Subsidized fertilizer is not priority to semi-arid regions such as Dodoma

### **Natural Resources**

#### **>Crops**

**Constraints**>> Infertile soils i.e. inadequate amount of Nitrogen and Phosphorus (cut across all crops) [1]; limited use of fertilizer [3]; limited access of manure; poor farming practices i.e. slash and burning result low turnover of soil organic matter, crops are competing due to mixed cropping etc [2]

**UPS**>> Soil moisture conservation technology [1]; mobilize fertilizer use to boost soil fertility [2]; intercropping [3]

#### **>Livestock**

**Constraints** >> Limited water sources and pastures particularly for cattle [1]

**UPS** >> Water related storage mechanism [1]; animal feed storage systems [2]

### **Production**

#### **>Crops**

**Constraints**>> Poor farming practices i.e. mixed cropping, tillage, planting [1]; Use crop varieties which have low genetic potential, low yield and do not tall with available moisture/rainfall variability [2]; poor extension service i.e. not necessary function of their presence [3]

**UPS**>> Use best ways of intercropping [3]; improves seeds and drought resistance varieties [1]; mobilization and trainings i.e. extension services and education [2]

#### **>Livestock**

**Constraints** >> Unaware of using animal power [2]; less productive breeds for both indigenous cattle and local chicken [1]; animal pests and diseases [3]

**UPS** >> Train on best way using animal power [2]; improve animal feeding [3]; improve breeds i.e. cattle and local chicken [1]; vaccination

## **Marketing**

### **>Crops**

**Constraints**>> Limited supply i.e. sunflower, sesame, millet, maize etc [1]; limited quality of packaging materials; absence of de-hulling machine for sunflower; absence of storage facilities i.e. private warehouses storage fee is very high [2]; short food chains (limited value addition activities) i.e. sesame, groundnuts etc [3]

**UPS**>> Increase production of agricultural products [3]; improve food value chains and by-products mainly for sesame and groundnuts [2]; improve storage facilities [1]

### **>Livestock**

**Constraints** >> Inadequate knowledge of livestock by-products [1]; poor market linkages for local chicken [2]

**UPS** >> Trainings on how to manufacture various by-products from livestock such as skin, bones, milk etc [1]; forward market linkages particularly for local chicken [2]

## **Processing**

### **>Crops**

**Constraints**>> Limited level of technology i.e. de-hulling machine, absence of refining technology for sunflower oil [1]; absence of min-lab, whereby, processors can't sell to specific customers given specification of the order [2]

**UPS**>> Increase production level for most of crops [2]; improve storage for maintaining produce supply [1]; de-hulling machine [3]; refining technology; establish min-lab

### **>Livestock**

**Constraints** >> Limited livestock by-products related to skin, milk etc [2]; limited technology i.e. solar power based incubators [1]

**UPS** >> Develop light industries and processing units [2]; introduce and developing simple and solar power based incubators in rural areas [1]

## **Consumption**

### **>Crops**

**Constraints**>> Poor quality of produce and products i.e. unrefined sunflower oil etc [2]; limited knowledge related to nutrition [1]

**UPS**>> Education and training i.e. diets and nutrition issues [1]; enhancing technology advancement i.e. refine oil [2]

### **>Livestock**

**Constraints** >> Limited use of most of livestock related products i.e. meat, milk [1]

**UPS** >> Mobilize and train of benefits of using livestock by-products [1]

## **3.2.3 National Level**

**National:** National priority crops are: *maize, rice, sugarcane* and *sunflower*. Other crops receive little attention under ASDP II and BRN initiatives.

## **Natural Resources**

### **>Crops**

**Constraints** >> Inefficient use of water resources [1]; ineffective land use and planning [3]; low fertilizer use and misconception [2]

**UPS** >> Constructing water reserves and schemes [1]; mobilizing fertilizer use [2]; train of best farming practices of maintain fertility i.e. intercropping etc [3]; land use and planning

### **>Livestock**

**Constraints** >> Overstocking i.e. indigenous cattle [3]; inadequate water reserves and dams [1]; poor land use and planning [2]

**UPS** >> Destocking and mobilization on best alternative measures such as sources of income etc [1]; building water reserves and dams [2]; land use and planning initiatives [3]

## **Production**

### **>Crops**

**Constraints** >> Inadequate production (limited supply of most of agricultural produce) for both quantity and quality particularly cereals [1]; fake seeds and herbicides is a serious problem [2]; limited institutional capacity in terms of human resources, facilities etc e.g. TOSCI, ASA etc;

challenges associated with distribution of farm inputs i.e. seeds and fertilizers; limited irrigation schemes [3]

**UPS** >> Farm level and productivity related interventions i.e. improved seeds and supply, fertilizer related intervention etc [1]; effective use of demonstration plots; improve farm inputs distribution systems [3]; build irrigation schemes and rain water harvest systems [2]; capacitate local institutions i.e. ASA, TOSCI for effective implementation of laws and policy related to farm inputs

### >**Livestock**

**Constraints** >> Animal diseases and awareness [3]; unproductive breeds [2]; limited pastures and water reserves [1]

**UPS** >> Vaccination and trainings [3]; improve breeds for commercial benefits [2]; improve pastures and water storage [1]

### **Marketing**

#### >**Crops and Livestock**

**Constraints** >> Poor integration of both farm inputs and produce markets [3]; inadequate market related information and data for all agricultural related products and farm inputs [1]; inadequate storage facilities i.e. warehouses, WRS, cold rooms etc [2]; poor infrastructure for linking rural areas with small towns and markets [3]

**UPS** >> Enhance market integration capturing all agricultural related commodities and farm inputs [3]; market information system development i.e. harmonize existing systems for good future coverage, formalize, disseminate to majority etc [2]; improves infrastructure i.e. rural roads; strengthen WRS and build warehouses [1]

### **Processing**

#### >**Crops and Livestock**

**Constraints** >> Limited knowledge of food value chain actors i.e. production practices, related to value additions, by-products, technologies, markets etc [1]; Limited level of processing technology [2]

**UPS** >> Trainings and knowledge enhancement of all key stakeholders along food value chains [1]; processing technology and products quality improvements [2]; establishing standard unit measure for different agricultural products [3]

## **Consumption**

### **>Crops and Livestock**

**Constraints** >> Bad altitude of consuming quality products and livestock products such as milk [2]; limited technological capacity of processing firms and institutions [1]

**UPS**>> Increase awareness of issues related to product quality and use [2]; improve technology levels for having quality products [1]

### **3.3 Emerging Key Policy Issues from National Stakeholder Meeting (2014)**

A National stakeholders' workshop was conducted within the Trans-SEC project so as to share some policy issues emanated from baseline survey hence look for more comments from stakeholders. The meeting brought together a wide range of stakeholders in the FVC including farm inputs agencies, policy makers and researchers. Therefore, some of key policy issues raised by these stakeholders are: erratic rainfall; land scarcity for crop production, land conflicts between farmers and livestock keepers, farmers and investors-case of Kilosa (Ilakala and Changarawe); low use of improved agricultural inputs (availability, pricing, knowledge, late supply, discrimination of farmers in the NAIVS); distribution of fake inputs-threatening the food security;

Other issues emanated from meeting are: inadequate number of Agro-dealers (poor access to improved inputs); unreliable power supply and outages; inadequate skills for processing (raw products); poor processing technologies (use of poor & rudimentary tools); poor access to processing services (inadequate milling machines, high milling prices); poor milling quality; unreliable markets; price fluctuations for produce; measuring beyond the normal size; high cess levy but also vary from place to place; roadblocks (deterioration of produce quality); poor quality products (unsorted, dirty)-low market prices; inadequate supply to meet the market demand; farmers-price takers (cannot negotiate for good price); poor road infrastructure (market access); unfair competition-oil seeds; poor access to market information; inadequate storage facilities (encourage pest infestations, moisture content-leading to poor quality products); food safety issues (aflatoxin in maize, groundnuts etc) during value addition and processing; and processing environment-Sanitary and Phytosanitary (SPS) matters e.g. how deal with contaminants during value addition.

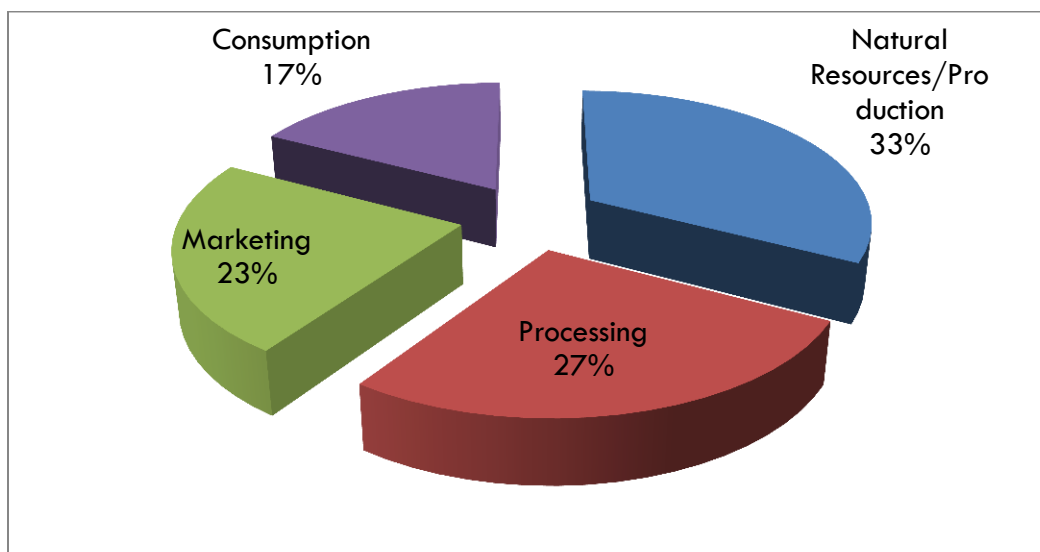
### **3.4 Establishing an inventory of UPS in Tanzania**

As mentioned earlier, the process of establishing an inventory of UPS related to food value chain in Tanzania has been done in highly participatory way including accommodating the list of UPS from different organizations and literatures. Several steps of developing the inventory were very helpful for not only Trans-SEC scientists and CSS stakeholders. The steps were useful on producing

ex-ante impact assessment of the few selected UPS and simulating adoption rate for these UPS hence projecting likelihood of adopting them given local conditions and stakeholders criteria.

A structured UPS inventory /database was developed based on the criteria as they have been fine-tuned, revisited, amended, refined and ranked by all Trans-SEC partners such as scientists and other stakeholders. Apart from having a long list of UPS from local stakeholders such as farmers and other actors along the food value chains at the villages level, other stakeholders of the related features have been used at the district, regional and national level. Thus, all UPS from these levels were revised by partner institutions through combining the related ones together hence having the common inventory of UPS. These are partly implemented by the project and would be applicable in future to the project and beyond.

So far, we have managed to have more than 50 UPS which are having direct relationship with food value chains in Tanzania. Major five value chain components have been involved and these UPS are in one way or another relies to them. These components are natural resources, production, processing, marketing and consumption. However, one UPS within one food value chain component can have relationship or link with the other component. For instance, raising local chicken can result into not only marketing related benefits through income from selling poultry and/or eggs but it can improve diet needs of the households hence accessing more nutritious food. These linkages of one UPS in a particular component to the other components have been reported to most of UPS. Figure 3 shows distribution of these UPS across food value chain components. Combination of natural resources and production components has higher composition such as 33% of the UPS inventory following by marketing component, 23% and others (Fig. 3).



**Figure 3: Distribution of UPS Inventory across FVCCs**

Furthermore, UPS inventory has been designed in a way that it shows relevant scale level of each UPS listed (Annex 1). In this category of the UPS inventory description, the scale level in term of

whether the UPS is relevant at the local level (villages), district, regional and national has been clearly shown. Thus, most UPS reported to have relevance at the local, district and regional level. Limited number of UPS has relevance to national level due to geographical diversity and other differences which are associated with soils, climate, nature of crops, household level of income and others. In this regard, most of marketing related UPS revealed to have relevance to all scales including the national level.

Generally, development of the UPS inventory was based on what we call sheet of fact and figures. The composition of the sheet includes but not limited to: name of the UPS; FVC component (s) where the UPS belongs; key constraints which can be addressed by the UPS; description of the UPS; proved success in Tanzania and supporting references; types of food crops and/or livestock related products which can be tackled by the UPS; technical specifications and dimensions regarding implementation of UPS; scale level (s); possible limitations of adopting the UPS and linkages of the UPS with other FVC component(s).

The following is the list of all UPS given their corresponding FVCCs; however, some have linkages with other food value chain components as shown in Annex 1. Natural resources/production: secured land tenure, fertilizer micro-dosing, optimized weeding program, promoting improved varieties, insecticides/herbicides/vaccination, early planting, rainwater harvesting (ridge/pit), participatory pest control, integrated agronomic practices (in drought prone agriculture), improved cultural practices, improving soil quality through agro-forestry, promote fodder tree technologies and pastures, train new approaches for water use and management, promote cattle fattening and better animal feeding, improve cattle breeds, blending local knowledge for decision making in natural resource management and micro-credits/saving and credit associations.

Processing: crop by-products (on-farm and processing), collection and utilization of manure, production and use of biogas, optimization of oil extraction, optimization of cereal storage systems, processing residue utilization for bio-energy, improved cassava processing, alternative energy source for poultry feed, establish de-hulling machine (sunflower), milk collection centers with cooling facilities/cold chains, improve animal feeds, waste utilization through hybrid system (for biogas, soil nutrients and electricity), improved wood supply, solar/kerosene based incubator.

Marketing: periodic markets, new product development, m-Integrated Market Access System (m-IMAS), integrated rural poultry-crop system, high value agro-forestry trees, organizing farmers for improved market access, establishing min-laboratory (sunflower oil), crop banking, rural markets construction, promote use of weigh scales and quality control in selling crops, enhancing marketing through harmonization of policies and regulations and profitable and market oriented storage. Consumption: household centered nutrition education, kitchen gardens, mobilize milk drinking/breast feeding, improve nutrition through improved been varieties, train on dietary diversity and nutrition-hygiene, influence perception and demand for milk (behaviour change), improving access to and consumption of animal source foods, promoting quality protein maize and storage of indigenous fruits and vegetables.



## 4.0 CONCLUSION

Generally this piece of work covers suggested upgrading strategies based on constraints of the crop(s) and/or sub-sector(s) among the different scale levels. In most cases, stakeholders combined agricultural commodities under the strong assumption that they have similarities in terms of constraints hence suggested corresponding upgrading options. Priority of the crops and livestock and its products vary across villages, districts and regions given potentiality of the sector and the area. However, there is no significant mismatch of upgrading strategies and views among stakeholders.

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## Annex 1:UPS Inventory Summary and their FVCCs Linkage

LIST	FVCC	UPS	FVC Component Linkage					Relevant Scale Level			
			NR	PRD	PRO	MKT	CONS	CSS	District	Regional	National
01	Natural Resources and Production	Secured land tenure		X	X			X	X	X	
02		Fertilizer microdosing			X	X	X	X	X	X	
03		Optimized weeding			X	X	X	X	X	X	X
04		Improved seeds			X	X	X	X	X	X	X
05		Insecticides/herbicides/vaccination			X	X	X	X	X	X	X
06		Early planting			X	X	X	X	X	X	
07		Rainwater harvesting (ridge/pit)			X	X	X	X	X	X	X
08		Participatory pest control									
09		Integrated agronomic practices			X	X		X	X	X	X
10		Improving cultural practices			X	X		X	X	X	
11		Improving soil quality through agro-forestry		X	X			X	X	X	X
12		Promote fodder tree technologies and pastures			X	X	X	X	X	X	X
13		Train new approaches for water management		X				X	X	X	X
14		Promote cattle fattening and better feeding			X	X	X		X	X	X
15		Improve cattle breeds				X	X		X	X	X
16		Blending local knowledge for decision making		X				X	X	X	X
17		Micro-credits/saving and credit associations			X	X	X	X	X	X	X
18	Processing	Crop by-products (on-farm & processing)	X	X		X		X	X	X	X
19		Collection and manure utilization	X	X		X		X	X	X	
20		Production and use of biogas	X	X					X	X	
21		Optimization of oil extraction				X		X	X	X	
22		Optimization of cereal storage systems				X	X	X	X	X	X
23		Processing residue for bioenergy	X	X				X	X	X	X
24		Improved cassava processing		X		X	X		X	X	X
25		Alternative energy source for poultry feed		X		X	X		X	X	X
26		Establish de-hulling machine (sunflower)		X		X			X	X	
27		Milk collection centers with cooling facilities		X					X	X	
28		Improve animal feeds		X					X	X	
29		Waster utilization through hybrid system	X	X				X	X	X	X

30		Improved wood supply	X	X	X			X	X	X	X
31		Solar/kerosine based incubator				X	X	X	X	X	X
32	Marketing	Periodic market		X			X	X	X		
33		New product development		X	X		X	X	X	X	X
34		m-Integrated Market Access System (i-IMAS)		X	X		X	X	X	X	X
35		Integrated rural poultry-crop system		X			X	X	X	X	X
36		High value agro-forestry trees	X	X	X		X	X	X	X	X
37		Organizing farmers for improved market access		X				X	X	X	X
38		Establish min-laboratory (sunflower oil)			X		X		X	X	
39		Crop banking			X		X		X	X	X
40		Rural markets construction		X	X		X		X	X	X
41		Promote use of weigh scales and quality control			X		X	X	X	X	X
42		Enhancing marketing through policies		X		X		X	X	X	X
43		Profitable and market oriented storage		X	X		X	X	X	X	X
44		Consumption	HH centered nutrition education		X				X	X	X
45	Kitchen gardens			X		X		X	X	X	X
46	Mobilize milk drinking/breast feeding			X	X	X		X	X	X	
47	Improved nutrition through improved bean			X					X	X	X
48	Train on dietary diversity and nutrition-hygiene			X				X	X	X	X
49	Influence perceptions and demand for milk			X					X	X	
50	Improving access of animal source food			X					X	X	
51	Promoting quality protein maize			X					X	X	X
52	Storage of indigenous fruits & vegetables			X	X	X		X	X	X	

*Note: Detailed list of UPS and sheets of facts and figures is available in the inventory excel file*

## Annex 2: Morogoro Local Stakeholders Main Crop/Sub-sector Scores Based on Impacts

Type of Impact	Criteria	Sub-sector/crop								
		Maize	Paddy	Sesame	Cowpeas	Sorghum	Cassava	Sunflower	Beans	Other Legumes
Food security, poverty and sustainability	Direct contribution to FS	5.0	1.5	3.5	3.5	2.0	2.5	4.0	3.0	3.0
	Future potential	5.0	2.5	3.5	4.0	3.0	2.5	5.0	5.0	3.0
	# of poor HH involved in the sector	5.0	2.5	4.0	4.0	2.0	3.0	3.0	5.0	3.0
	Availability of natural resources	3.0	2.0	3.5	4.5	5.0	5.0	5.0	5.0	5.0
	Average	4.5	2.1	3.6	4.0	3.0	3.3	4.3	4.5	3.5
Structure of the chain	Extent of value adding potential (stability, profitability)	3.0	2.0	4.5	2.5	1.0	2.0	2.0	5.0	4.0
	# of different products produced	3.0	2.5	2.5	1.5	1.0	2.0	2.0	2.0	2.0
	Length of marketing chain (# of intermediaries)	4.5	1.5	4.5	3.5	1.0	2.0	3.0	2.0	2.0
	Marketing potential	4.5	2.5	4.5	5.0	1.0	2.0	3.0	2.0	2.0
	Potential for lessons learnt/ replication mechanism	5.0	3.5	4.0	4.5	2.0	3.0	5.0	2.0	3.0
	Average	4.0	2.4	4.0	3.4	1.2	2.2	3.0	2.6	2.6
	Overall average	4.3	2.3	3.8	3.7	2.1	2.7	3.6	3.6	3.1

Note: A score of 1 meaning that the particular commodity did not meet that criteria (minimum compliance), and a score of 5 meaning that the commodity best met that criteria (maximum compliance)

### Annex 3: Dodoma Local Stakeholders Main Crop/Sub-sector Scores Based on Impacts

Type of Impact	Criteria	Sub-sector/crop							
		Millet	Sorghum	Maize	Ground-nuts	Sunflower	Other Legumes	Bambara-nuts	Sesame
Food security, poverty and sustainability	Direct contribution to FS	5.0	2.5	2.0	4.5	4.0	3.0	3.0	3.0
	Future potential	5.0	3.5	3.0	5.0	4.0	3.0	3.0	4.0
	# of poor HH involved in the sector	5.0	4.5	2.5	5.0	2.0	3.0	3.5	3.0
	Average	5.0	3.5	2.5	4.8	3.3	3.0	3.2	3.3
Structure of the chain	Extent of value adding potential (stability, profitability)	2.5	1.5	2.0	2.5	5.0	2.0	1.0	1.0
	# of different products produced	2.0	2.0	1.5	3.0	5.0	3.0	1.0	1.0
	Length of marketing chain (# of intermediaries)	2.5	2.5	1.5	5.0	3.0	1.0	1.5	4.0
	Marketing potential	1.0	1.5	3.0	4.5	3.0	1.0	2.0	5.0
	Potential for lessons learnt/ replication mechanism	4.0	3.5	4.0	5.0	5.0	2.0	2.5	5.0
	Average	2.4	2.2	2.4	4.0	4.2	1.8	1.6	3.2
	Overall average	3.7	2.9	2.5	4.4	3.8	2.4	2.4	3.3

Note: A score of 1 meaning that the particular commodity did not meet that criteria (minimum compliance), and a score of 5 meaning that the commodity best met that criteria (maximum compliance)

#### Annex 4: Consulted Stakeholders during Higher Level UPS Selection

S/N	NAME	INSTITUTION/OFFICE
01	Herbert Hatibu	Ministry of Industry and Trade (MIT)
02	Chibole T. Manumbu	Ministry of Industry and Trade (MIT)
03	Magreth Hall	Ministry of Industry and Trade (MIT)
04	Maige, J.D	Ministry of Agriculture, Food Security and Cooperatives (MAFC)
05	Happy Pascal	Ministry of Agriculture, Food Security and Cooperatives (MAFC)
06	Denis Nguruse	Tanzania Co-operative Development Commission (TCDC)
07	Amina Musa	Tanzania Co-operative Development Commission (TCDC)
08	Abraham, B	Regional Secretariat (RS)-Dodoma
09	Bogit, S.S	Regional Secretariat (RS)-Dodoma
10	Peter B. Bayo	Regional Secretariat (RS)-Morogoro
11	Evance Gambishi	Regional Secretariat (RS)-Morogoro
12	Rozalia Rwegasira	Regional Secretariat (RS)-Morogoro
13	Dkt. Msimbe G.A	Regional Livestock Officer-Morogoro
14	Swai, E	Agricultural Research Institute (ARI)-Hombolo
15	Grace M. Nyamwangi	District Council (DC)-Chamwino
16	Ronald M. Wesaka	District Council (DC)-Chamwino
17	Jonnie V. Semwaiko	District Council (DC)-Chamwino
18	Tatu Mwenda	District Council (DC)-Chamwino
19	Helena C. Myanda	District Council (DC)-Kilosa
20	Mary Ng'unga	District Council (DC)-Kilosa
21	Finulis Tarimo	District Council (DC)-Kilosa
22	Kigaru Nshiku	District Council (DC)-Kilosa [Trade Officer]
23	Farahani, M	District Council (DC)-Kilosa
24	Dkt. Mgeni, Y.L	District Council (DC)-Kilosa [Livestock Officer]
25	Maarufu Mkwaya	District Council (DC)-Kilosa [Trade Officer]
26	Nickson Elly	Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA)
27	Andrew Kunda	Agricultural Seed Agency (ASA)-Production Manager
28	Willson Kashanga	ZL – SYNGENTA Tanzania
29	Mahaliwa B. Msungu	Msungu Eng. Works
30	Agnes, H	Central Zone Sunflower Processors Association (CEZOSOPA)
31	Nehemia	Small Industries Development Organisation (SIDO)-Dodoma