academicJournals

Vol. 10(12), pp. 1376-1385, 19 March, 2015
DOI: 10.5897/AJAR2014.8901
Article Number: 526FDFB51785
ISSN 1991-637X

http://www.academicjournals.org/AJAR

African Journal of Agricultural Research

Full Length Research Paper

Comparing stakeholder views for mutual acceptable food value chain upgrading strategies in Tanzania

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Received 6 June, 2014; Accepted 11 March, 2015

The number of rural poor has been reported to rise in Sub-Saharan Africa (SSA) while per capita food consumption in the region is on the decline and food insecurity has been much embedded. Thus, knowing upgrading strategies (UPS) to be used in making a living and would have great chance of benefiting majority hence provide solutions to poverty, food insecurity and malnutrition. This paper assesses and compares the views of local stakeholders and agricultural experts in terms of prioritizing food securing UPS along food value chains (FVC). Data and information have been collected in a highly participatory process so as to develop an approach and experience in Tanzania regions to support poor people in rural areas to upgrade their position in viable FVC. Local stakeholders' definition of food security rely on food availability component, hence this paper centers on two major FVC components such as natural resources and crop production for maize and millet subsectors in Morogoro and Dodoma regions of Tanzania, respectively. Given natural resources, agricultural experts favor soil improving upgrading strategies in Morogoro and water management in Dodoma, whereby, local stakeholders in both regions prefer farm inputs related UPS for improving soil fertility (seed varieties improvement and fertilizer use). There is no significant mismatch of views for production component apart from differences on ranks. Stakeholders in both regions prefer use of improved crop varieties, pests and diseases control and new livestock management including having village land use planning. It is recommended that satisfactory participation of local stakeholders should be considered during testing stage of FVC upgrading strategies, including packing these innovations to suit local conditions and finally empower all potential actors for successful dissemination and outreach.

Key words: Rural household, food security, upgrading strategy, food value chain, Tanzania.

INTRODUCTION

The world's population will be 34% higher than today by 2050 and 70% more food is needed especially in developing countries, thus, global food supply should increase significantly (FAO, 2013). Though developing

countries will demand more food, there is greatest production capacity potential (Haug and Hella, 2013). Tanzania like other developing countries is facing numerous challenges in the agriculture sector and food value chains (FVCs) requiring efforts towards poverty reduction and increasing food security (FS) (MAFAP, 2013). Therefore, an improvement in Tanzania's agriculture and rural areas is required particularly for farm level productions, yields and crop intensity, expansion of arable land and promotion of value addition. Thus, enhancing FVCs for increasing food security in this country is the best intervention point (Gómez et al., 2011). Also, reduction of food insecurity would require FVCs that links global beneficiaries to local actions in a highly participatory way such as a poor people-centered approach (Graef et al., 2014).

In this regard, an assessment has been done to verify if there is divergence of views and perceptions from local people and agricultural experts in terms of prioritizing food securing upgrading strategies (UPS) along FVCs. Whereby, FVCs comprise set of actors and activities required to bring the products to consumers including components like natural resources, crop production, processing, marketing and consumption (Gómez et al., 2011; Kaplinsky and Morris, 2000). Based on local definition of FS, this paper is restricted to natural resources and crop production hence adopts these two FVCs components only. And UPS means success stories, good practices and/or technological innovations (Graef et al., 2014). The central aim was to develop an approach and generate experience in Tanzania regions to support poor people in rural areas to upgrade their position in viable value chains.

Local FS definitions and main agricultural sub-sectors selected have been used to guide the assessment process and compare views emanated from village level key stakeholders and combinations of experts from Tanzania and German. The method adopted in the paper provides a replicable approach for involving both local stakeholders and agricultural experts. Their views and/or opinions of potential UPS along FVCs components can be used to design effective and efficient mechanism. In this paper, views from stakeholders show their prospects of different good practices or innovations which can increase efficiency of FVCs components. Thus, bringing multi-stakeholders views together is the promising way for agricultural development in countries like Tanzania (IFAD and UNEP, 2013).

OUTLINING STUDY, FIELDWORK AND METHODS

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 theoretical analysis, this paper attempts comparing UPS related views as they have been identified among main sub-sectors based on important FVC components in four case study sites (CSS).

In this light and as explained by Graef et al. (2014), the project scientists would specify and select a set of 3-5 UPS per FVC component, and subsequently the stakeholders would select only one most promising UPS per FVC component at each CSS for more in-depth analysis and tests. Also, various discussion 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 will be disseminated though a German-Tanzania network of stakeholder organizations at policy, extension and farmer school levels (Figure 1).

Data collection overview

We used mainly focus group discussions (FGDs) to get required data and information from local stakeholders comprising men, women and youth. Checklist and structured questionnaire are main tools used for data collection. 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. Discussion which were held for 5-6 h 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.

Agricultural expert views on UPS were collected based on main successful UPS brainstormed by 30 scientists and given under the guidance of associated information, for instance by (Kimenye and Bombom, 2009). Thus, this covered a wide range of not only criteria given under the Trans-SEC but also FS oriented ones (FAO, 2011). Expert views were obtained through structured questionnaire and a total of 32 Tanzanian and German members from the Trans-SEC consortium filled it. Given the list of targeted beneficiaries of the project in CSS and total number of the consortium members; only 10 and 32% of total number of targeted respondents contacted respectively. Thus, the sample of local stakeholders and Trans-SEC project scientists and the stratification method used results fairly better number of representatives of the study.

Case study sites overview

Local level data were collected from two villages in each district, that is, Kilosa district villages namely: Changarawe and Ilakala and for Chamwino district is Idifu and Ilolo in Morogoro and Dodoma regions respectively (Figure 2). These locations have been selected due to diversity of their food systems with both food-insecure and food-secure sensitivity (Table 1). Thus, an in-depth analysis to be done in the CSS as shown in Figure 1 and knowledge to be gained in these districts would be replicable and fungible (substitutable,

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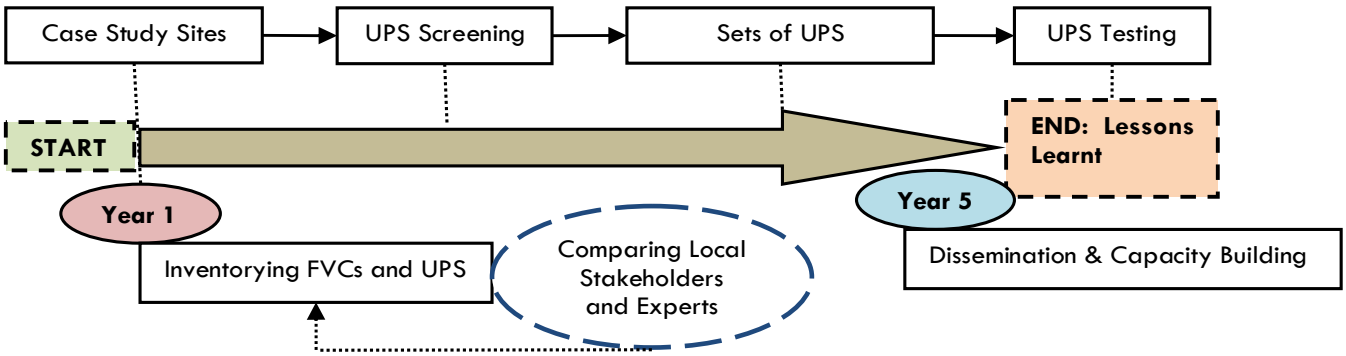

Figure 1. Simplified steps of food value chain spatio-temporal research design (modified from (Graef et al., 2014)).

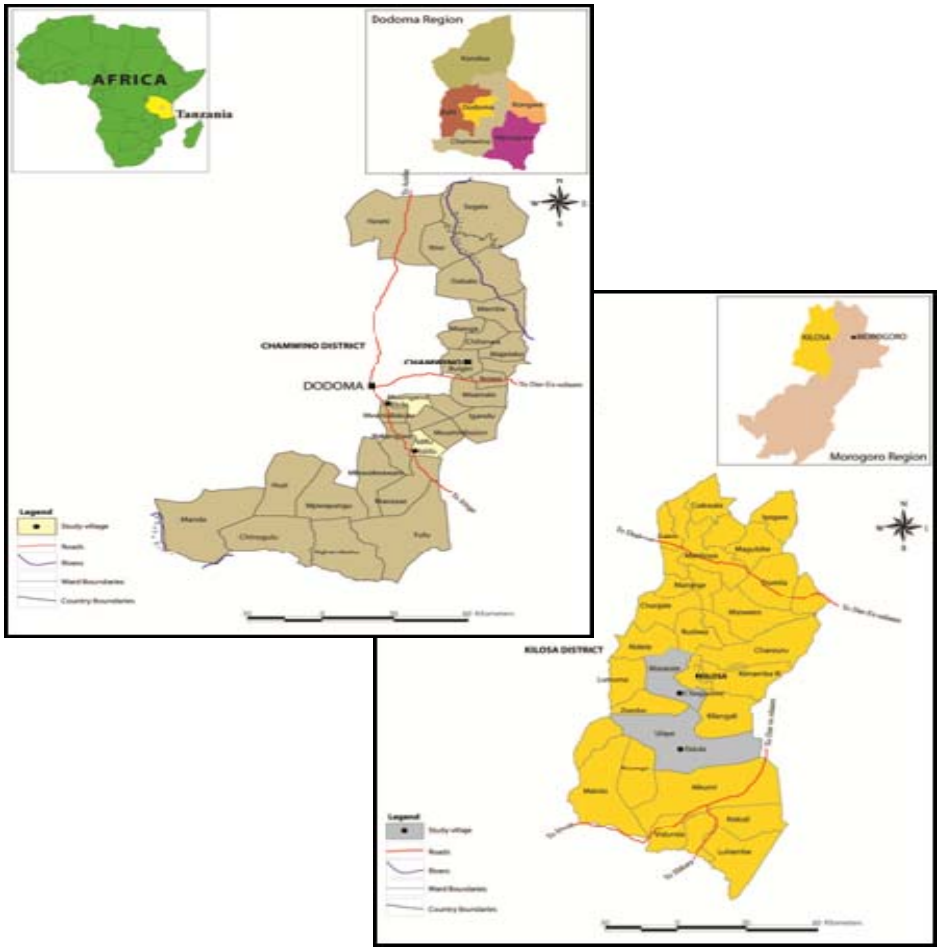

Figure 2. A Map of case study sites.

interchangeable, exchangeable or replaceable) from one region to other regions in Tanzania.

Stakeholders engagement overview

The UPS assessments originated from both local stakeholders (at the village level) and experts who are affiliated with different institutions (Figure 3; Graef et al., 2014). About 34% of total experts revealed to have expertise in both Morogoro and Dodoma regions. Whereby, local level stakeholders were dominated by smallholder farmers and millers, traders and processors occupy only 36%. We had the strong assumption that, the majority of stakeholders' have knowledge on all FVC components including natural resources (land and water) and production (seeds, planting, and crop husbandry).

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 to 800 mm)	Semi-arid (350 to 500 mm)
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).

Table 2. Local definitions of food security.

Morogoro		Dodoma	
Changarawe	**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
CSS stakeholder consensus			
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

RESULTS AND DISCUSSION

This section presents results and discussion obtained from ranking exercise of UPS as views of local stakeholders from study villages and from experts. Ranks of these UPS have been grouped with respect to the main FVCs components which have significant contribution to food availability such as natural resources (soil and water) and production (seeds, planting, crop husbandry). Moreover, these two components have revealed to be very important among FVCs compared to others and supported by majority of stakeholders in Dodoma and Morogoro regions. As mentioned above, divergence or convergence of experts views are compared with local UPS ranks for maize and millet sub-sectors. These sub-sectors represent the main food crops in Morogoro and Dodoma regions, respectively, given local definitions of food security.

Local food security definition and sub-sector selection

Using highly participatory process, FVCs components have been quickly mapped in the CSS, an inventory of potential UPS have been prepared and finally prioritized at the local level. At this 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 1 and 2). As local definitions and criteria of FS to the great extent rely on food availability (Table 2), 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 1 and 2). Food availability is probably key component of FS as far as Tanzanian government recently reported to struggle balancing food availability given food market prices (Haug and Hella, 2013). Thus, views which were collected from experts have been compared with local stakeholders as far as UPS assessments and ranking is concerned.

Local stakeholders main crops scores based on impacts

Local stakeholders in Morogoro and Dodoma regions

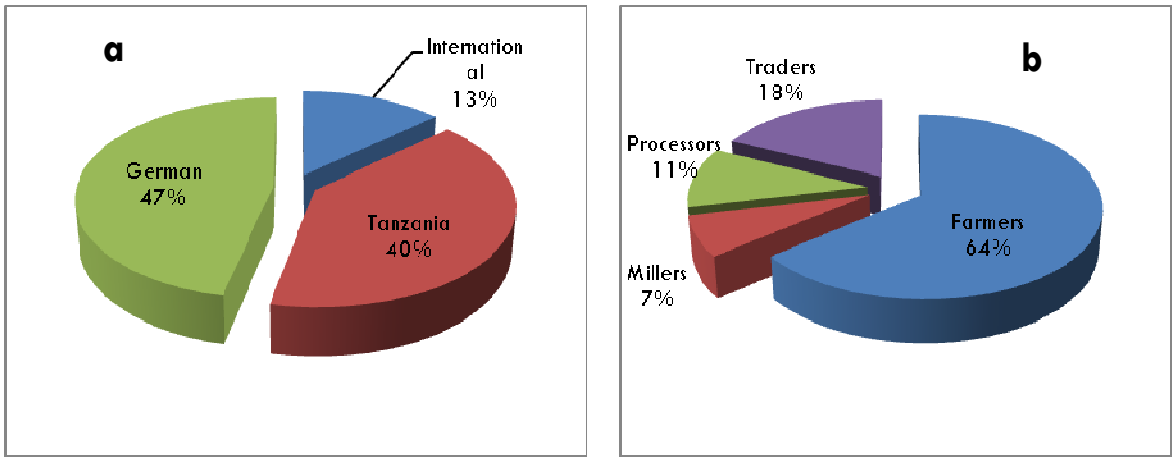

Figure 3. Nature of stakeholders engaged a. Institutional expert coverage b. Local stakeholders.

through their groups gather numeric scores for main crops which are grown in their villages then simple averages made (Figure 3). According to Sanogo (2010), this is very important step which used to check the way FVC conforms to the criteria developed. Thus, in the current paper 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 (Annex 1 and 2). 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 (Figure 4). Based on local definitions of FS, the authors have to consider one crops/sub-sectors from each region 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 (Figure 4b). While, in Morogoro region the highest score of 4.5 revealed on maize and beans crops (Figure 4a). In this regard, the authors 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 2) 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.

Natural Resources (soil and water)

Agricultural experts favored soil improving UPS in Morogoro and water management in Dodoma as far as they are sub-humid and semi-arid regions, respectively. However, local stakeholders in both villages in Morogoro prefer much farm inputs related interventions for improving soil fertility such as through good seed varieties use and fertilizer application to increase their farm productivity. Whereby, views of stakeholders such as local and experts from both regions are more or less the same though the issues of farm inputs also emanated in Dodoma (Table 3). Farm inputs retailers reported to be located very far from households in all villages surveyed. This has also been reported by (Benson et al., 2013) that 4.8 km is likely to be the shortest average distance in Tanzania to the fertilizer retailer from the farm. Also, the main reported reasons for low rates use of improved seeds and fertilizers are costs and awareness (World Bank, 2012).

In Morogoro region, erosion as suggested by 42% of total experts interviewed is not considered a significant constraint to local stakeholders. Improvement of crop yields depends much on water availability in the soil (Makurira et al., 2011) in combination with proper use of fertilizers (Tesfaye et al., 2011) hence increase yield through crop intensification (Aune and Bationo, 2008). Also, local stakeholders in Morogoro have a preference on better land use planning as opposed to what suggested by experts (Table 3).

This is not surprising as documented by (Buck and Milder, 2012) in Southern Agricultural Growth Corridor of Tanzania (SAGCOT) green growth leaders' workshop reported that land use planning can improve land security, increase water flows and reduce human conflict if grazing pressure is a problem. For instance, in Kilombero and Kilosa which are districts in Morogoro region, land use planning has been implemented only in

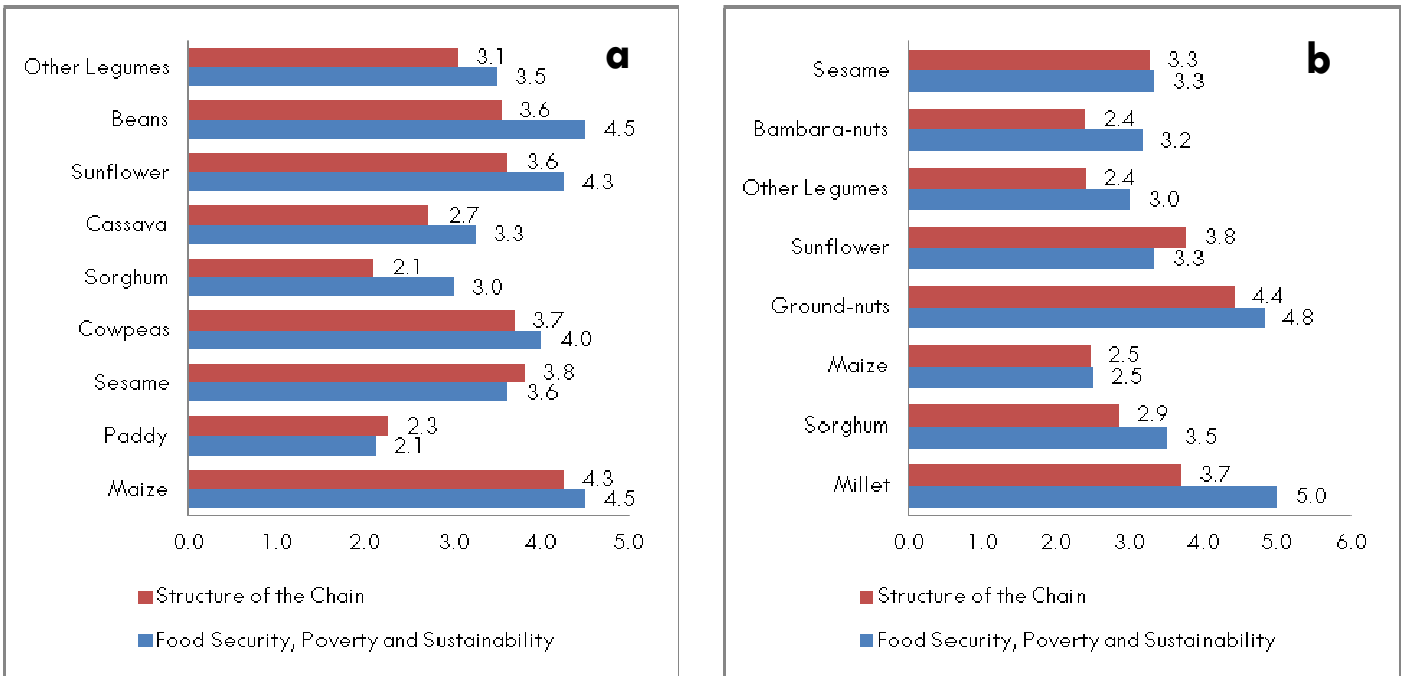

Figure 4. Average Local Stakeholders Crops Scores Based on Impacts a. Morogoro Region b. Dodoma Region. Note: A score of 1 meaning that the particular commodity did not meet that criteria (minimum compliance), and a score of 5 meaning that the commodity best met that criteria (maximum compliance).

35 out of 94 villages and 33 out of 118 villages, respectively. Whereby, grazing pressure is one of the main issues in the Kilosa district. Proper land use taking into consideration the size of the land and application of recommended rates of other farm inputs such as fertilizers and herbicides etc with proper management would increase farm productivity hence profit (Mwinuka, 2013; Vanlauwe et al., 2011). However, an indepth assessment of soils and perception of fertilizer use by smallholder farmers would add value before associated interventions take place in CSS (Oluwasegun Fasina, 2013; Marenya and Barrett, 2009; Aphunu, 2011) and land-use dynamics should be well analyzed because fertile land and freshwater is under pressure (Müller and Lotze-Campen, 2012).

Crop production (seeds, planting, and crop husbandry)

To a large extent, views from experts and local stakeholders are like counterparts though they differ the way they were ranked. However, cover crops and intercropping related UPS in Morogoro and Dodoma was not in the same direction of what suggested by local stakeholders in all villages (Table 3). As suggested by all stakeholders, availability of farm level inputs such as improved seeds varieties (according to 2010/11 National Panel Survey (NPS) only 16.8% of Tanzanian households used improved seeds), herbicides and knowing how to use them through availability of extension services would increase food availability. Availability of agricultural extension services is also a very important UPS as suggested by local stakeholders in both regions. Whereby, the related initiatives should be given a priority in rural areas of Tanzania so as to increase farm inputs uptake hence more food availability (Benson et al., 2013; Ricker-Gilbert et al., 2011; Xu et al., 2009). More importantly, the uptake of these inputs may be catalyzed by other UPS such as fertilizer micro-dosing (Camara at al., 2013; Twomlow et al., 2010). In this regard, something should be done in Tanzania since little uptake of existing improved soil, water and land management practices reported (Kristjanson et al., 2012).

In this regard, Kimenye and Bombom (2009) supported not only improving crop varieties and crop management practices but also finding the best way of working in partnership with all stakeholders, cluster UPS suiting farmer conditions and empower them to take charge of their UPS requirements. The same scenario has been insisted by (Verkuijl et al., 1998) that not only local stakeholders particularly farmers should participate in the process of developing UPS but also development of improved crop varieties should consider yield and other important features such as drought resistance/tolerance, resistance to storage pests, shelling quality, and taste of the produce for meeting consumers needs. As enlightened by (Liwenga et al., 2012) that local

Table 3. Local and expert UPS ranking for natural resources and crop production.

Morogoro Region – Natural Resources				Dodoma Region – Natural Resources		
Rank	**Ilakala local stakeholders**	**Changarawe local stakeholders**	**Experts**	**Idifu local stakeholders**	**Ilolo local stakeholders**	**Experts**
1	Short time seeds varieties	Land ownership and secure land tenure	Agroforestry	Water torerant varieties	Land use efficiency	Rainwater harvesting
2	Land use/planning	Irrigation	Consevation agriculture and ridges for erosion control	Short time varieties	Fertilizer application	Conservation agriculture and ridges as water catchments
3	Fertilizer use	Fertilization	Ridges as water catchments and rain water harvest	N/A	Extension services and ridges	Drip irrigation
Morogoro Region – Crop production				**Dodoma Region – Crop Production**		
Rank	**Ilakala Local Stakeholders**	**Changarawe Local Stakeholders**	**Experts**	**Idifu Local Stakeholders**	**Ilolo Local Stakeholders**	**Experts**
1	Education extension	Improved seeds	Intercropping	Apply best practice	Education on better waste/by products use as manure	Manure input and intercropping
2	Nearby stokist and follow best practice	Insectices and pesticides use	Improved crop varieties	Education on waste/by products use	Timely weeding	Cover crops
3	Herbicides use	Village land use planning	Cover crops and pest and disease control	Improved seeds	Extension officers	Pest and disease control and new livestock management

knowledge should be carefully considered when addressing different coping strategies related with food security such as flexibility on resource mobilization and use of labor for farm and off-farm activities hence manage food.

Conclusions

This paper presents the results of the research conducted to assess and compare the views of local stakeholders and agricultural experts for prioritizing food securing upgrading strategies. The research sought to develop the approach and experience in Tanzania on how to build up upgrading strategies and best practices of value chains activities through strong participatory process. These practices would be adapted to the local needs for impacting food insecure households.

Uncover complementarities during upgrading strategies development was necessary for having well branded good practices along food value chains. This bridge the knowledge gap between what is realistic and what is desirable given views from wider range of stakeholders. The approach and experience emanated through this paper which brings multi-stakeholder views together is the promising method for rural and agricultural development.

It is our strong believe that high stakeholder participation in the selection of upgrading strategies will strengthen their transferability and applicability to the other rural areas of Tanzanian regions and beyond. The authors found slight differences between expert and local stakeholders' views as expected. However, a consideration should be made on an improvement of crop varieties and crop management practices as suggested by local stakeholders to increase food availability and enhance food security. Thus, during the testing stage of different upgrading strategies local stakeholders should be involved fully, packing these upgrading strategies and/or innovations suiting their conditions and finally empower them for future successful dissemination and capacity building.

Conflict of Interest

The author(s) have not declared any conflict of interest.

ACKNOWLEDGMENTS

This publication is a product of the Trans-SEC project (www.trans-sec.org). The German Federal Ministry of Education and Research (BMBF) has funded it and the German Federal Ministry for Economic Cooperation and Development (BMZ) has co-financed the Trans-SEC project. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the BMBF and BMZ.

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Appendix

Annex 1. 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
	Lenght 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 2. 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

Annex 2. Dodoma.

	Lenght 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).