Framework for participatory food security research in rural food value chains

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Abstract:

Enhancing food security for poor and vulnerable people requires adapting rural food systems to various driving factors. Food security-related research should apply participatory action research that considers the entire food value chain to ensure sustained success. This article presents a research framework that focusses on determining, prioritising, testing, adapting and disseminating food securing upgrading strategies across the multiple components of rural food value chain. These include natural resources, food production, processing, markets, consumption and waste management. Scientists and policy makers jointly use tools developed for assessing potentials for enhancing regional food security at multiple spatial and temporal scales. The research is being conducted in Tanzania as a case study for sub-Saharan countries and is done in close collaboration with local, regional and national stakeholders, encompassing all activities across all different food sectors.

Keywords: food security; food value chain; action research; Tanzania; research framework

1. Introduction

Food insecurity is one of the most pressing challenges, particularly in developing countries. According to WHO (2013), food security is achieved when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life. Food security can also be considered as a function of food availability, food accessibility, food stability and food utilisation (FAO 2002, Ziervogel and Ericksen 2010). Different types of processes can impact food security at different and/or multiple spatial levels. These include loss of soil fertility and soil degradation (local, regional), urbanisation (regional, national), land use changes such as replacement of food crop areas with biofuels, industrialisation, population growth, droughts, domestic and foreign government policies, fluctuating market situations (national, global), and climate change (global).

Large-scale impacts are usually tangible down to local scale. Most of these processes are increasing, enhancing the unpredictability and insecurity of regional food supply, especially in sub-Saharan Africa (AbdulRahim et al. 2008, Foley et al. 2011, Van Rooyen and Sigwele 1998). The food security status is considered to be the primary outcome of a food system and the basic indicator of how well the food system functions (Ericksen et al. 2009).

The hunger crisis in 2011 and 2012 in the Sahel demonstrated the tremendous climate impact on the whole food system and the lack of effective strategies to secure the food supply (Maxwell and Fitzpatrick 2012). Both human and ecological framework conditions are changing rapidly (Lotze-Campen et al. 2010, Müller 2011). This raises an urgent and continuous need for a better integrated food system understanding and for developing region-specific and innovative strategies.

Research and development (R&D) projects so far have usually been top-down oriented and included one or only few disciplines, limiting their success. A number of recent international research and development projects have been focusing inter alia on increasing food security (World Bank 2012, CGIAR 2012, WASCAL 2013, Millennium Villages 2013) while including more food-related sectors and disciplines in a bottom-up approach. To achieve positive impacts and sustainable solutions, these projects increasingly focus on integrated in-depth analysis of the food system itself and its nexus elements. This encompasses amongst others a) natural and human resources, b) the use of production inputs, c) the safety and quality of food produced, d) the consumption patterns, and e) functioning of local and global markets (Foley et al. 2011, Pinstrup-Andersen 2002). To ensure enduring success, such analyses should include the specific cultural, political, social, ecological and economic environments, a broad participation of local and regional stakeholders, and a focus on local and regional site conditions (Below et al. 2012, Grimble and Wellard 1997, König et al. 2012, Reed et al. 2009). On the other hand, also political bottlenecks to food value chain (FVC) upgrading have been observed, for instance the persistence of urban bias (Bezemer and Headey 2008, Demont 2013, Laroche Dupraz and Postolle 2013) may jeopardize long-term sustainability of FVC strategies.

The term stakeholder refers to individuals, groups, and organizations that are directly affected by decisions and actions, such as local farmers, or that have the power to influence the outcomes of these decisions, for instance, governments (Freeman 1984).

The objective of this paper is to contribute to more sustainable impacts of R&D projects in rural food systems. We analysed the requirements for collaborative food system research in developing countries and developed an integrated framework for research along the entire rural FVC, including action research (Chambers 1994, Riisgaard et al. 2010). Our framework hence focusses on the rural FVC. Nevertheless, urban and rural food security is strongly interlinked and equally important. Rural food production may strongly depend on consumers and end markets in urban areas (USAID 2009). And urban consumption zones can have important leverage effects on rural FVCs and raise farmers' livelihoods. Our framework considers both subsistence and surplus farming for local and regional markets. Within an international research project (Trans-SEC: Innovating Strategies to safeguard Food Security using Technology and Knowledge Transfer: A people-centred Approach) this framework is applied with the aim to improve the food situation for the most-vulnerable rural poor population of Tanzania. It is designed to identify successful food securing upgrading strategies and/or innovations along local and regional rural FVCs (Gomez et al. 2011, Riisgaard et al. 2010). Furthermore, it tests and adjusts them to site-specific environments, prepares them for upcoming future challenges, and tailors these strategies to be disseminated and finally implemented for regional and national outreach. In this paper we present this novel FVC research framework.

2. Drivers of rural food systems – Tanzania as a case study

Rural food systems are increasingly impaired by various driving factors. The important drivers affecting these food systems include increasing pressure on the natural production resources land and water and climate change (Boko et al. 2007, Graef et al. 2000, Müller et al. 2011), increasing energy demand

(Haberl et al. 2011), population growth, changing trade patterns and economic systems through trade liberalisation and globalisation, and governance factors (Lotze-Campen et al. 2010, Riisgaard et al. 2008, von Braun 2007). Cause-effect-chains affecting local or regional food security have also influenced food systems over large regions (Ziervogel and Ericksen 2010). Most of these drivers reduce the productivity of food crops and reduce the land available per capita. Simulations on long- and medium-term global food and energy demands indicate that sub-Saharan regions are overproportionately affected (Haberl et al. 2011, Müller et al. 2011).
The food supply systems of rural Tanzania are increasingly connected to other biomass production systems such as feed, biofuel and construction wood (Mnenwa and Maliti 2010). They interact with regionally different biotic and abiotic resources as well as socio-economic and cultural environments (USAID 2008). Measures to stabilize and develop better food supply are particularly important in Tanzanian regions where the food situation is already insecure, such as in low-rainfall Eastern Tanzania. Agricultural systems of Tanzania usually provide the local communities with sufficient food, also generating income and enabling better education (Below et al. 2012, United Nations 2007). Nonetheless, improper development of the food production systems and FVCs can reduce and destabilise food supplies and thus increase food prices and price volatility (Foley et al. 2011, Kiratu et al. 2011). Total reliance on local food production and markets is risky because of climate-induced production failures. However, reliance on regional, national or international markets and/or imports is also risky due to price volatility (Seck et al. 2010). Another effect could be the displacement of vulnerable people from productive land due, for instance, to land use change (Riisgaard et al. 2010) or to various negative environmental impacts such as deforestation and declining soil resources (AbdulRahim et al. 2008, Thornton et al. 2006). The population's high AIDS rate of 5-6%, high malnutrition rates of under-five-year-old children (42% stunted, 20% underweight) (UNICEF 2013), and increasing other nutrition-related diseases such as diabetes (WHO 2012) are also negative drivers of Tanzanian food systems.

This calls for research on pathways for securing rural FVCs in Tanzania in different sectors (Gomez et al. 2011). These development pathways comprise (1) raising agricultural productivity and sustainability of natural biotic and abiotic resources (Foley et al. 2011, Graef et al. 2002, König et al. 2012), (2) enhancing integrated food supply systems using adequate food securing technologies and strategies (Graef and Haigis 2001, Waha et al. 2012), (3) enhanced processing and storage of food and end products (AbdulRahim et al. 2008, Leuenberger and Wohlgemuth 2006, Sabiiti 2011), and (4) economic and institutional mechanisms such as investment incentives, insurances, trade securities and policies (Arieff et al. 2009, FAO 2012, Godfray et al. 2010, UNCTAD 2009, Ziervogel and Ericksen 2010). Another development pathway is (5) creating off-farm employment opportunities, thus reducing population pressure on the land; this approach implies developing rural activities around agriculture, investing in rural infrastructure and strengthening rural institutions (Hounkonnou et al. 2012). Migration (6) is another pathway and an option for some regions directed at reducing pressure on land. Migration, however, is often a limited option because the absorptive capacity of other areas may be rapidly exhausted. A vital element is (7) the participatory involvement of local stakeholders (including women and minorities) and institutions with knowledge on upgrading strategies (AbdulRahim et al. 2008, König et al. 2012, Riisgaard et al. 2010). This involvement in particular needs to be combined with Tanzanian programmes on food security such as the *Agricultural Sector Development Strategy (ASDS).*

3. A food value chain analytical research framework for Tanzania

Analytically understanding a food system requires clearly defining its components and its boundaries (Ziervogel and Ericksen 2010). Rural food systems, such as those in most regions of Tanzania, include a) the use of local resources (soil, water, nutrients, energy, labour), b) the use of production inputs (technical devices, fertilizers, animal feed, seeds), c) techniques for ensuring safety and quality of food in production, processing and storage, d) specific consumption and dietary patterns, e) site-adapted cropping including agro-forestry elements, f) animal husbandry, g) local and/or regional market access and prices, and h) region-specific cultural, political and social environments and FVC governance.

Generally, the FVC as part of the food system (Gomez et al. 2011) consists of five main components (natural resources, food production, processing, markets and consumption). While most of these components require nutrient and/or food inputs and also entail respective losses, waste management can be regarded as a sixth component (Sabiiti 2011) (Figure 1).

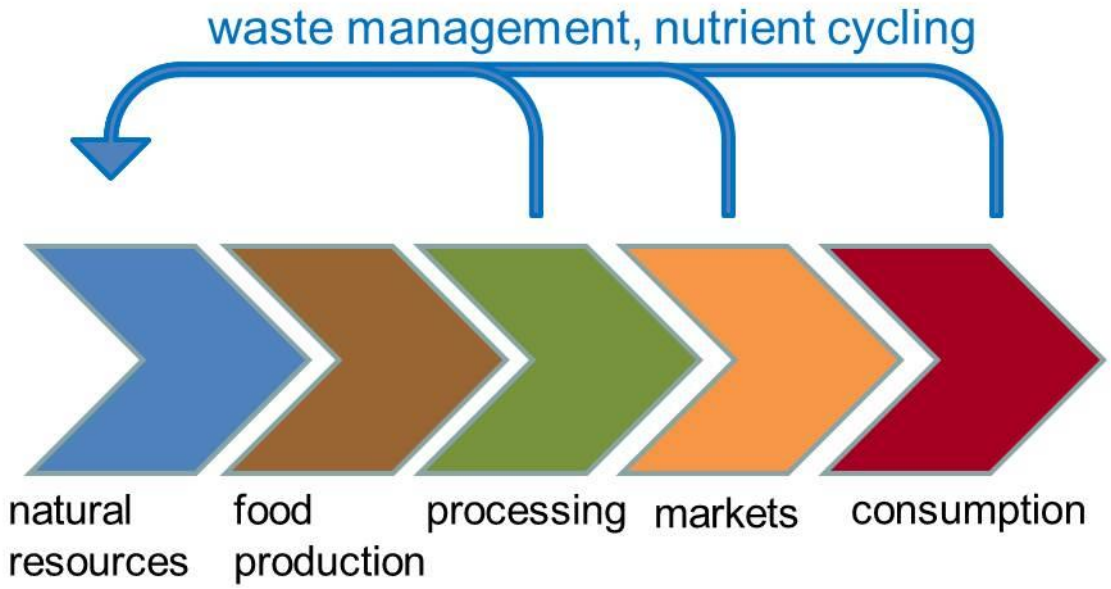

Figure 1: Food value chain components

3.1 Spatial research design in food value chains: regions and case study sites

Food securing research requires multidimensional action in space, time and among food sectors (Gomez et al. 2011, Ziervogel and Ericksen 2010). This calls for a spatial research design that enables upscaling of results in a generic manner to other regions with similar bio-physical, socio-cultural and economic conditions. Scoping surveys can be applied to identify the expected variability of major food systems. This approach can also help determine those sites that are representative for most agronomic environments of a target region.

For Tanzania two target regions were determined: Morogoro and Dodoma. For both regions sufficient baseline data and knowledge were aggregated for subsequent selection of two case study sites (CSS). The food systems in the predominantly semi-humid Morogoro region (600-800 mm of annual precipitation) with flat plains, highlands and dry alluvial valleys are more diverse; they are primarily based on maize, sorghum, legumes, rice and horticulture, partly with livestock. In the semi-arid Dodoma region (350-500 mm of annual precipitation) with flat plains and only small hills, the food system is primarily based on sorghum and millet with a strong livestock integration (Mnenwa and Maliti 2010). The Morogoro region contains areas with different levels of sensibility regarding food security (mostly due its more abundant precipitation). Dodoma, in contrast, features a predominance of high food insecurity areas. With regard to the natural environment, both regions together account for 70-80% of the farming systems types found in Tanzania (USAID 2008).

Within the target regions, the selected CSS should be able to represent the large variability of farming systems in the region. Hence, the main criteria for selecting the CSS are a) similar climates; b) differing market access; c) differing rainfed cropping systems, possibly integrating livestock; d) village sizes with 800-1500 households. If possible, villages are chosen where the Tanzanian smallholder farmer association MVIWATA is active and no other large R&D projects intervene. Other selection criteria include the number of stunted children below 5 years as an indicator for food insecurity, available logistics, infrastructure and facilities, differing wards, soil types, and population density. Each CSS consists of at least one local market place and the surrounding 2-3 sub-villages and has at least partial access to markets for cash crops. This creates a design with comparable and at the same time diverse environmental and socio-economic conditions. This design enables the investigation of food security upgrading strategies along the different FVC components (Figure 1 and 2). The spatial design applied (“two large regions, each with two CSSs”) hence supports upscaling and downscaling of findings and scenarios (Ziervogel and Ericksen 2010) across spatial scales and sectors in rural Tanzanian areas with comparable environments.

3.2 Food system analytical framework and research components

Food system research requires a holistic integrated approach, in some cases with recurrent activities (Gómez et al. 2011, Ziervogel and Ericksen 2010). The FVC research framework of this study includes the following food sectors, components and steps in an iterative and partly recurrent procedure (Figure 2):

(1) A stakeholder involvement process is set up from the beginning as an integral part of most analytical steps (König et al. 2012, Grimble and Wellard 1997). Accordingly, existing local and regional knowledge from key stakeholders (such as farmers, millers, stockiest, traders, middlemen, transporters and also extension officers) on site conditions, for instance on resource conservation, food production, processing and markets/society, is used (Reed et al. 2009). The level of participation is high because all relevant key stakeholders along the FVCs including the private sector will be identified following a regional stakeholder analysis (Grimble and Chan 1995).

(2) CSSs within the focal regions (Morogoro and Dodoma) are selected and established (Figure 3). For each CSS an inventory is set up including each of the five FVC components (natural resources, food production, processing, markets, consumption), including waste management/recycling. This encompasses most of the variability of Tanzanian rural FVCs and may differ in length. This inventory provides the basis for developing typologies of farming systems and FVCs (Andersen et al. 2007);

(3) promising upgrading strategies (success stories) of secure food production along the FVCs will be screened and inventoried among each FVC component in the CSS, the target regions, and beyond (Kimenye and Bombom 2009). They need selection criteria to be jointly defined with the involved stakeholders. Criteria for upgrading strategies, according to present expertise (Gomez et al. 2011, Riisgaard et al. 2010, USAID 2008), may include a) the expected positive impact on food and livelihood security; b) knowledge and data availability of previous implementations. Other more specific criteria are c) feasibility of analysing/testing in the project life time; d) rapid response to inputs; e) wide applicability and scale-up potential; f) compatibility with other interventions; g) long-term (>5 years) success; h) good cost/benefits ratio; i) demonstrated success in target regions; j) environmental sustainability; k) long-term resilience to climate change; l) social and cultural acceptability; and m) focus on preventing increase of social differences or conflicts.

(4) the FVC inventory is then analysed in-depth with regards to the significance, practicability and interrelations of its components. The next step is an assessment of their costs, benefits and impacts on food security and social differences;

(5) by involving research partners and the CSS stakeholders, the most promising upgrading strategies with regard to positive impacts and implementation are participatively identified for subsequent in-depth testing and analysis (Grimble and Wellard 1997); only one promising food securing upgrading strategy per FVC component is identified according to the expected positive impact on food security. This procedure, driven by iterative focus groups and alternative methods, for instance Delphi methods, takes place across all four CSSs. This yields a feasible number of five most promising upgrading strategies per entire FVC (one per FVC component) and per CSS. They may be either chosen to be connected to each within the FVC or to be independent.

(6) The identified five upgrading strategies are subject to a) an ex-ante scenario analysis without field testing consisting of comprehensive and participatory impact assessments based on existing data, stakeholder and scientists' experience and other expert knowledge (Morris et al. 2011, König et al. 2012)(Figure 3). Subsequently, b) these five upgrading strategies are then narrowed down to a core of only 2-3 most promising upgrading strategies together with stakeholders for each CSS for practical in-depth testing and/or analysis over a three-year period. This involves applying action research (Riisgaard et al. 2010) and - for the case of natural resources and food production - accompanying on-station validation under controlled conditions. They are participatively tested with field trials in the CSS (natural resources, food production, processing, waste management) or analysed in-depth at the CSS- and regional market level (processing, markets, consumption). These research activities may relate to technical, institutional, behavioural, and capacity building innovations. During testing, the potential scenario/strategy impacts on food security and interrelations with other FVC components are to be investigated. To enable statistical comparison of results for each FVC component, at least two tests/analyses will be done throughout both target regions using a similar set of assessment criteria and/or indicators. This set of indicators for the FVC performance will be jointly developed and may comprise, for instance smallholders and/or consumer nutritional status, income generation, environmental impacts, and energy use (Gómez et al. 2011) while serving different market segments and creating food security for a) poor consumers through affordable food, b) poor workers through increased employment

opportunities, and c) poor farmers through increased access to local and regional food markets and, hence, higher and more stable incomes.

(7) The sustainability, future implementation and transferability of tested upgrading strategies are then analysed. The accompanying impact assessments use political, cultural, societal, environmental and economic risk factors in markets and FVCs. This is achieved with involved researchers and stakeholders for different scenarios and future conditions (Morris et al. 2011). Alternative options are investigated for enhancing, adapting and/or recombining the upgrading strategies of FVC components across the CSS (Riisgaard et al. 2010).

(8) The models SWIM (Krysanova et al. 2005), LPJmL (Waha et al. 2012) and IMPACT (Rosegrant et al. 2008), which simulate different environmental and socio-economic conditions, will provide inputs for ex-ante impact assessments of upgrading strategies with the stakeholders for the most likely future scenarios. They include risk analyses and final climate proofing to identify regional hot spots of most sensitive, fragile regions and their potentials for alleviating food insecurity.

During the process of selecting, testing and assessing upgrading strategies, storylines on success stories and possible new combinations of FVC components are prepared for dissemination and outreach. This is done via the research network and stakeholder organizations through capacity-building workshops at the policy, extension and farmer school levels (Hounkonnou et al. 2012, Reed et al. 2009). Dissemination strategies and up-scaling practices aim at covering large parts of rural Tanzania. Hence, the main research activities and focus are on local and regional food security, even though the research design implies a multi-dimensional impact and a national outreach.

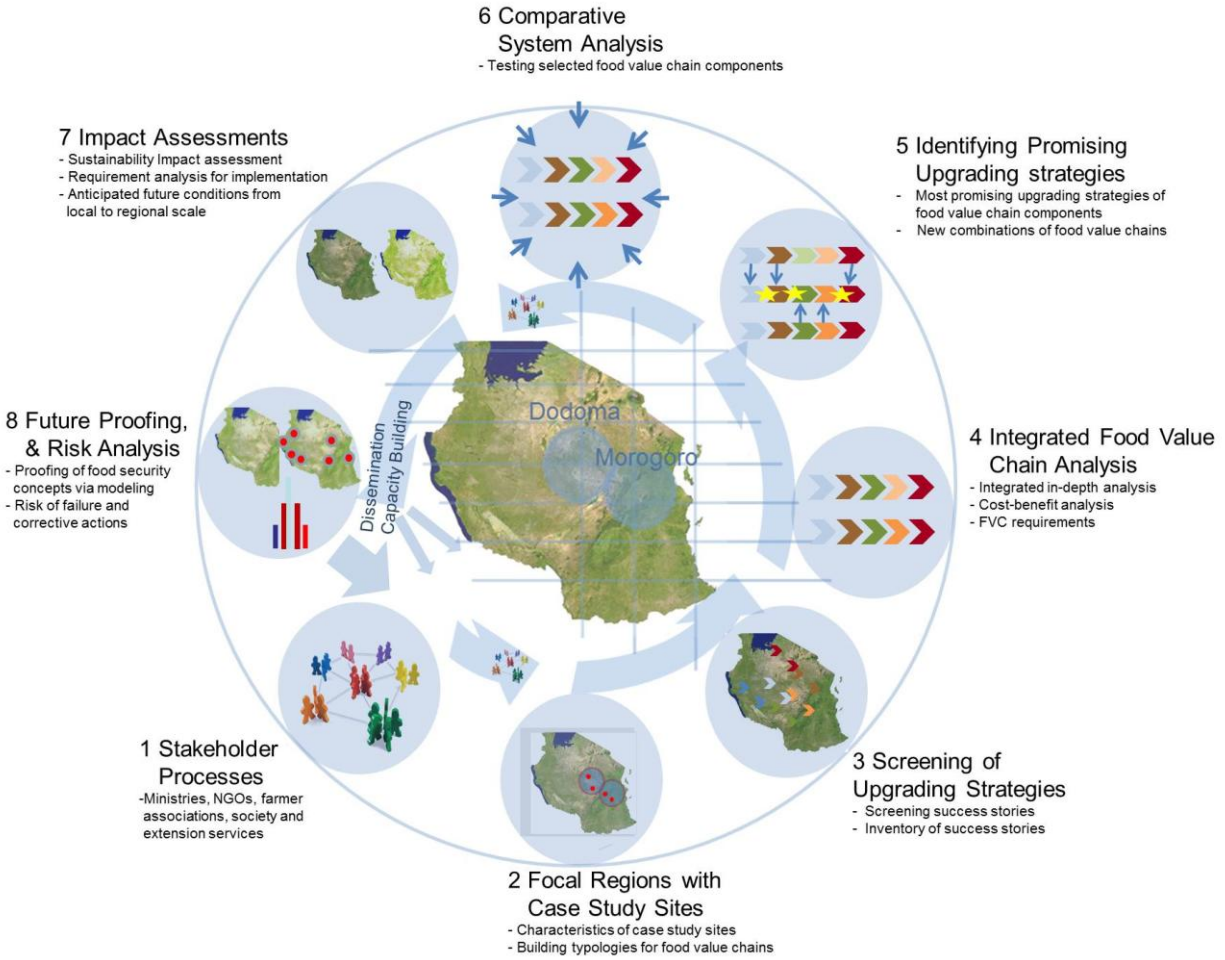

Figure 2: Food system analytical framework and steps

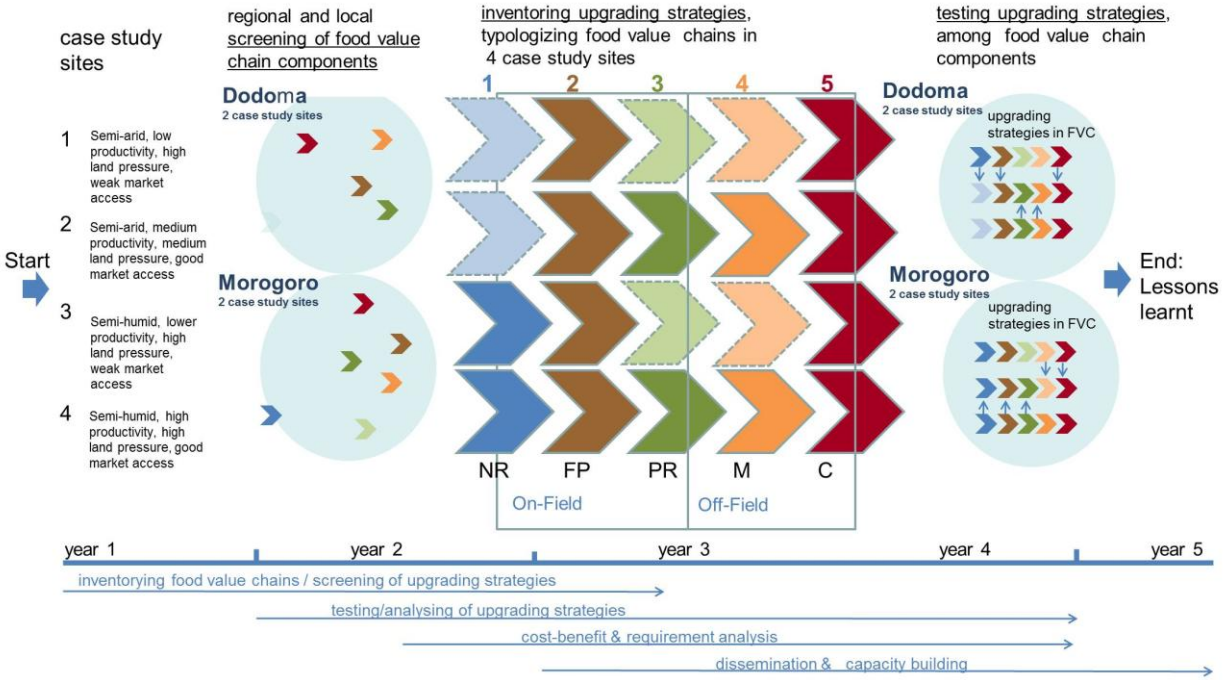

Figure 3: Food value chain and temporal succession of research tasks (NR – natural resources, FP – food production, P – processing, M – markets and institutions, CP – consumption; more description given in text)

The framework for participatory food security research comprises eight thematic research clusters with action tasks (Table 1). These reflect the multi-dimensional requirements of a holistic FVC approach (Gomez et al. 2011) and simultaneously demonstrate the structure and schedule of the analytical framework (Figure 2 and 3). This approach includes the relevant food-related sectors and its nexus elements: natural and human resources, use of production inputs, safety and quality of food produced, consumption patterns, local and regional markets. With a broad participation of local and regional stakeholders (Grimble and Wellard 1997, Reed et al. 2009) it accounts for the variability of specific cultural, political, social, ecological and economic environments (Riisgaard et al. 2010, Ericksen et al. 2009). The FVC framework addresses the components of the rural Tanzanian food systems with differing emphasis. The analysis, practical testing, adaptation and dissemination of upgrading strategies is scheduled for at least three, preferably five or more years.

Table 1: Research clusters and tasks in a food value chain research approach for Tanzania

1 Research coordination and management
1.1 Setting-up and securing the research network, management and scientific coordination
1.2 Risk control and supervision of research processes; mediation for inter-cultural understanding
1.3 Academic capacity building (CB), knowledge transfer and sustainability of Trans-SEC
2 Participative stakeholder systems and knowledge transfer
2.1 Identifying stakeholder groups; planning stakeholder involvement, roles and tasks
2.2 Establishing stakeholder groups; planning and conducting local and regional workshops, focus groups, rapid appraisals
2.3 Operational preparing, setting-up and conducting of on-farm trials in case study sites and (few) on-station trials for validation
2.4 Analysing and considering gender and socio-cultural differences
3 Food value chains and risk analysis
3.1 Identifying, defining and typologising FVC components and upgrading strategies; establishing a comprehensive Tanzanian inventory
3.2 Analyzing the current situation (baseline) by socio-economic, natural resource-oriented household surveys in case study sites: wave 1
3.3 Assessing and analyzing the impact of upgrading strategies within FVC by socio-economic household surveys: wave 2
4 Natural Resources
4.1 Establishing a web-based Geo-Information-System (GIS) with a multi-scale digital Food Security Atlas (FSA) of Tanzania
4.2 Developing and applying tools to link-up crop, land evaluation and water management to optimize planning of food security
4.3 Modelling climate risks for regional production systems and FVC (Models SWIM, LPJmL, IMPACT)
5 Food production
5.1 Analysing the current situation regarding biophysical conditions along with rainfed crop-, livestock- and agroforestry systems (baseline)
5.2 Participatory on-farm/station testing, monitoring and assessing impacts of a) natural resource conservation technologies and b) crop production technologies
5.3 Analysing and enhancing food quality and consumption practices; minimizing food quality losses related to food processing
6 Post-harvest processing, biomass and waste product utilization
6.1 Analysing, testing and assessing impacts of improved regional and local post-harvest processes including biofuel/biogas options (Life Cycle Assessment)
6.2 Analysing options on waste management and nutrient cycling
6.3 Assessing income potentials of complementary biomass production in crop production systems
7 Commercialisation, trade, policies and institutions
7.1 Assessing crop commercialisation pathways for smallholders; enhancing market integration and information to bring added value in food systems
7.2 Assessing national market and trade policies; scenarios of market expansion; and regional trader surveys to assess market chains on input-output prices
7.3 Analysing supportive and inhibitive policies and related regional and national institutions to recommend reforms in and beyond FVC and output markets
8 Integration and dissemination
8.1 Synthesizing all conducted FVC assessments of upgrading strategies (ex-post and ex-ante impact assessments); recommendations
8.2 Synthesizing innovation feasibilities on the information flows in Tanzanian food systems
8.3 Disseminating successful strategies, methods and results at the level of policy, institutions and media

3.3 Institutional framework for food security research

A sufficiently large number of local partners is required to ensure that research remains demand-driven and highly relevant to local needs, rural markets and institutions (Hounkonnou et al. 2012). This will also ensure that local information is adequately understood and fed into research and development (Riisgaard et al. 2010). This approach requires an adequate institutional setting with regards to local and regional stakeholder involvement, capacity building and governance of FVC components (AbdulRahim et al. 2008) including the option of creating public-private partnerships.

The FVC research framework presented here includes five Tanzanian partners, two international CGIAR centres, and seven partners from Germany. It thus represents a medium-size consortium covering the relevant topics and important institutions of food systems in Tanzania. All partners build on previous collaboration with national and international institutions during past agricultural research activities. The African partner institutions for Tanzania encompass the Sokoine University of Agriculture (SUA), Agricultural Research Institutes of Tanzania (ARI), the Tanzania Federation of Cooperatives (TFC), the Agricultural Council of Tanzania (ACT), and the National Network of Small-Scale Farmers' Groups in Tanzania (MVIWATA). Tanzanian ministries and/or departments dealing with food security are also involved as stakeholders and advisory key members. International research centres include the ICRAF (World Agroforestry Center) and IFPRI (International Food Policy Research Institute). The German partner institutions encompass the ZALF Leibniz-Centre for Agricultural Landscape Research, University of Hohenheim (UHOH), the Leibniz University Hannover (LUH), the Humboldt-University of Berlin (HU), the German Development Institute (DIE), the Potsdam Institute for Climate Impact Research (PIK) and the German Institute for Tropical and Subtropical Agriculture (DITSL).

Such an interdisciplinary and intercultural research task requires specific actions in order to facilitate discussions across cultural backgrounds and various expertises, and also to avoid conflicts. However, as conflicts are likely to occur in such a coordinated work, they need to be correctly targeted in order to be moderated and resolved. This work will be done by external consultants responsible for establishing a conflict prevention and management (CPM) System as a platform for good collaboration within the consortium (SM in Figure 4).

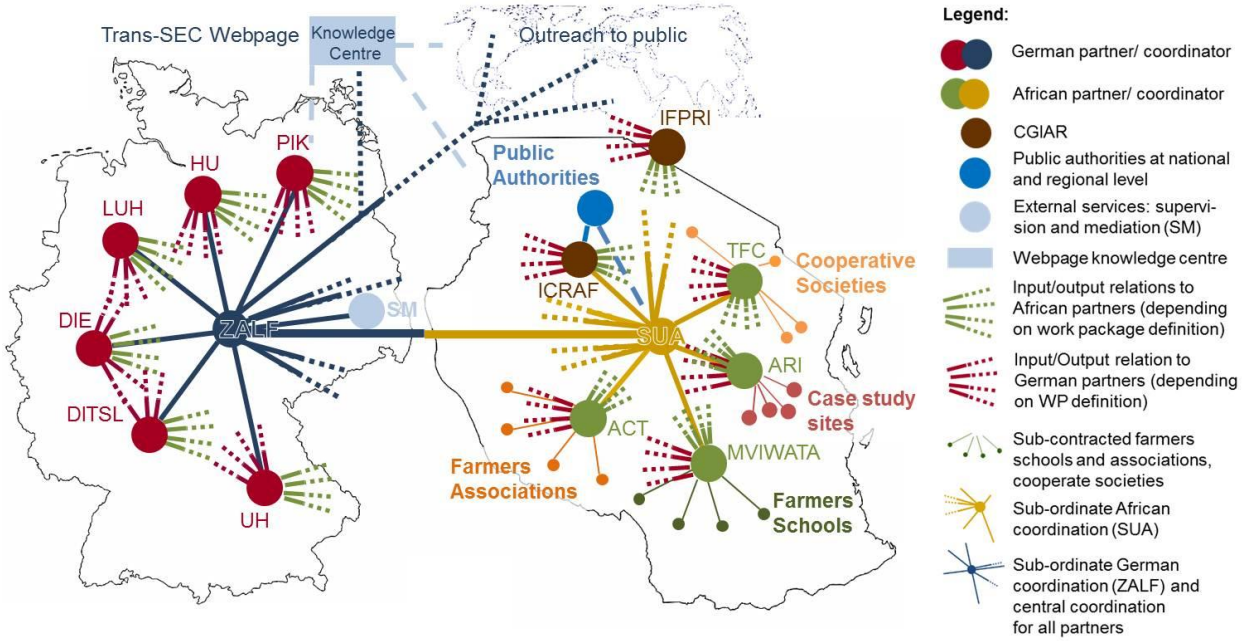

Figure 4: Mapping of the Trans-SEC organisation development

As seen in Figure 4, we use a system of intra- and inter-organisational development among organisations, regions and stakeholders, according to the suggestions of Grimble and Wellard (1997). Information input/output flows among partners involve a) a central coordination and b) a Tanzanian sub-coordination for operational management. Standard information on administrative and risk management tasks will be managed using a knowledge centre on internal webpage areas.

3.4 Framework transferability to other Subsaharan countries and beyond

The FVC variability in time and space has two effects: It frames but also impedes the precise determination of research actions, which require a long-term and multi-scale perspective (Gomez et al. 2011, Graef et al. 2000). Nevertheless, we believe our novel FVC research framework is applicable to any rural Subsaharan cropping region and beyond, and to a broad range of farms and environments. It can be modulated and refined depending on the prevailing food system and the related potential food security risks. For instance, in more arid regions more emphasis should be put on FVCs that include drought-tolerant crops, livestock husbandry and water harvesting technologies (Thornton et al. 2006, Ziervogel and Ericksen 2010). Transferring results from local, regional or national scales to other Subsaharan countries is possible if sufficient spatial data are available, preferably on typologies of natural and human environments, the food production systems and related risks (Mnenwa and Maliti 2010, Müller et al. 2011, Riisgaard et al. 2010). This clearly requires taking into account that up-scaling processes involve the risk of incrementing prediction uncertainty. While this framework focusses only on rural FVC, urban food security is strongly interlinked. Developing rural FVCs, for instance, can decrease food costs for poor urban consumers, while at the same time increasing earnings for poor farmers via increased demand and employment.

4. Summary

We propose a novel framework for food security research integrating the entire rural FVC and apply this framework to Tanzania as a case study. Over a period of three to five years this framework aims at identifying, prioritizing and implementing upgrading strategies along the FVC and assessing their feasibility, risks and impact.

Policy integration is critical for the success of this type of research. We develop tools that link up scientists and policy makers and enable them to assess potentials enhancing regional food security at multiple spatial and temporal scales across the various food sectors. Furthermore, to ensure the continuation of this research framework the Tanzanian partners create sustainable support mechanisms on both food and research policy level.

Conflicts are likely to occur in such an interdisciplinary and intercultural research framework. This requires conflict prevention and management (CPM) to mediate and facilitate the communication across different cultural backgrounds and expertise.
;
The upgrading strategies implemented along FVCs bring added value for the involved stakeholders (farmers, pastoralists, consumers, processors, traders, scientists, policy makers and public administration). At the same time, capacity building on upgrading strategies improves their knowledge base and adaptation flexibility in food-insecure situations. The implementation feasibility of successful upgrading strategies is tested under site-specific conditions with local stakeholders in two Tanzanian regions. For most Tanzanian regions the FVC research framework provides and disseminates ex-ante impact assessments of promising food securing technologies, supporting smallholder communities. This approach is expected to produce outreach within Tanzania and beyond by collaborating with educational and scientific associations as well as public research organizations and policy makers in the respective disciplines (agronomy, socio-economy, agro-technology, food-processing and governance). Once this framework is established and its core products are generated, we believe that the rural poor people will be significantly more food-secure and therefore better prepared to cope with future environmental, social or economic changes that may affect food security.

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