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Participatory Scenario Building to assess possible implications of gender and socio-cultural factors for innovation uptake decisions in Tanzanian farming communities

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1. Introduction

Under the framework of Trans-SEC -"Innovating pro-poor strategies to safeguard food security using technology and knowledge transfer" – this research aimed to identify social, cultural and gender specific factors influencing innovation decision making processes with local smallholder farmers in the Trans-SEC case study sites (CSS). In the past, studies were often concerned with measuring innovation success in terms of econometric adoption rates, leaving socio-cultural differences in farmers' experience and problem perceptions largely unexplored (Pannell, 1999). Adoption rates alone are not able to reflect the complexity of farmers' decision making processes, which lead to the implementation of an innovation. Socio-cultural factors can influence such decision making, as well as innovation outcomes, and should therefore be an important consideration for innovation research and development projects (Alarcón and Bodouroglou, 2011; Edwards-Jones, 2006; Kassie et al., 2014; Quisumbing, 1995).

In order to identify such factors, a Participatory Scenario Building (PSB) methodology was developed for farmers to collectively identify and evaluate expected risk and outcome scenarios, of various self-identified innovations, with facilitation by scientists. To meet this aim, the study addressed the following specific objectives:

- To collaboratively define and characterise important gendered and socio-cultural differences in the four Trans-SEC CSS
- To collaboratively assess how these socio-cultural factors influence farmers' perspectives on and uptake of innovations.

This study involved facilitation of three collaborative learning (CL) farmer groups to select innovations, on the basis of their collaboratively identified problem-situations, group visions and best-fit solutions. This is embedded in a broader transdisciplinary, participatory action research process[1] that worked closely with farmers. Transdisciplinary research aims to deal with complex problem situations relevant to society, by integrating different types of knowledge (Andrén, 2010). Further, our approach explicitly considers different social subjectivities and foregrounds the farmers' perspective (Bank of Tanzania, 2014; Hoffmann-Riem et al., 2008). The PSB process developed in this study aimed to discover challenges and

[1] Supporting studies facilitated the implementation process and monitored outcomes (Fernandez, 2016; Thapa, 2016; Mieves, forthcoming).

constraints to innovation uptake, as well as to identify social relations that could possibly influence decisions in other ways.

This report now presents the case study sites and describes the methods used. Next, the results section includes a short quantitative analysis of socio-economic factors prevalent in the four CSS, followed by definition and description of prevailing social factors based on participatory analyses with the farmer groups. Finally, results pertaining to the relations of defined social factors to innovation uptake decisions are presented. The conclusion summarizes our findings.

2. Methods and materials

2.1 Study area: Tanzania

In 2012, the population of Tanzania was 44.9 million (URT, 2013). The country is divided into 30 regions and further subdivided into districts. The most recent Human Development Index (HDI) by UNPD in 2014, estimated a score of 0.488, which ranks the east African country as number 159 out of 187 countries (UNDP, 2014). The main contribution to GDP in Tanzania is agricultural production, contributing ca. 25% (Bank of Tanzania, 2014). According to FAO (2015), 73% of the population are occupied in agriculture. However, reliance on rainfall, poor technology adoption, land degradation, poor access to markets and lack of infrastructure do not favour agricultural production (FAOSTAT, 2015).

Figure 1 Map of Tanzania; source: www.nationsonline.org

In 2012, it was estimated that 73% of the population lived with less than 2 USD per day and that 39% are undernourished (World Bank, 2015). The country is a net importer of food with

a negative overall trade deficit of 22% for 2011 (FAOSTAT, 2015). In sum, food insecurity, rural poverty and climate change call for the development of more resilient and pro-poor agricultural systems, which makes Tanzania an important research area.

2.2 Case study sites

The case studies sites (CSS) are located in the contrasting regions of Morogoro and Dodoma, seen in Figure 1 and 2. An overview of the study regions is given in Table 1.

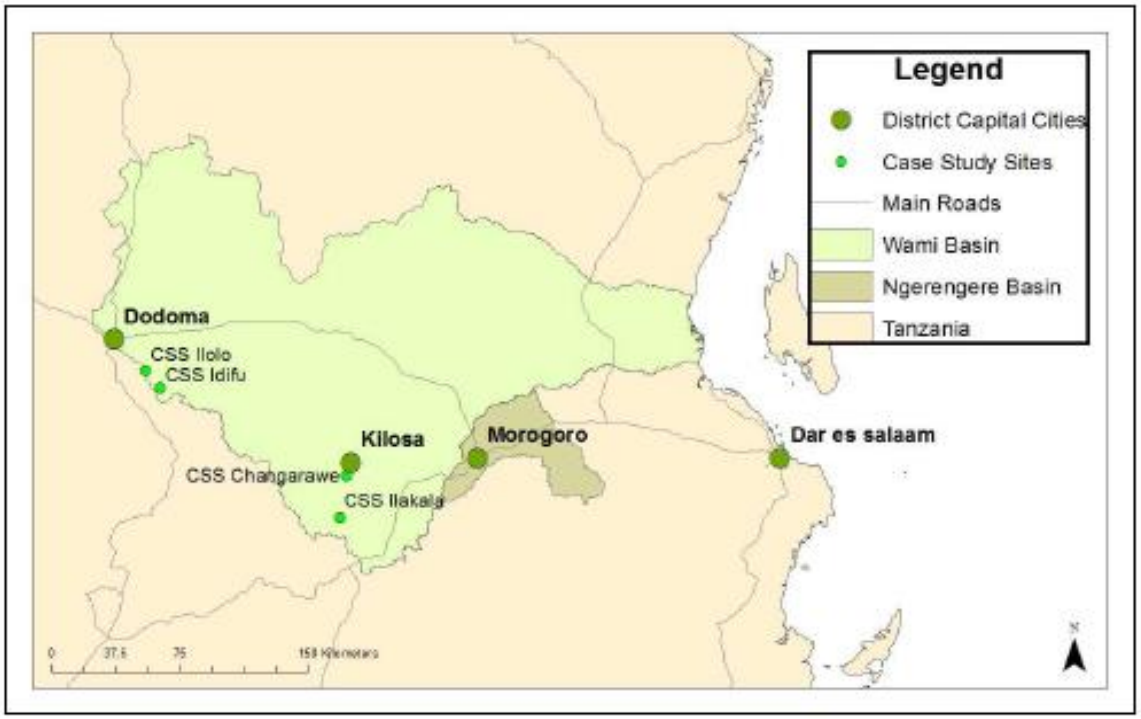


Figure 2. CSS locations in Tanzania; Source: (Pendo Schaefer and Dietrich, 2014)

Table 1 Features of Dodoma, Morogoro and the CSS

	Dodoma	**Morogoro**
Population (2012)	2,083,588	2,218,492
Climate	Semi-arid Dry season: April-December Rainy season: January-March	Semi-humid Dry season: June-October Rainy season: November-May
Rainfall	350-500mm	600-800mm
Contribution to nationals GDP per capita	690,000 TSh	Approx. 1,000,000 TSh
Households in agriculture	358,969	298,421
Adult literacy (2012)	67,5%	76,9%
Main food crops	Sorghum, Millet	Maize
Main cash crops	Groundnut, sunflower	Simsim
Ethnic groups	Mono-ethnic: Gogo (99%)	Multi-ethnic: about 40 tribes
Households with livestock (2008)	29%	16%

Source: (Höhne, 2015; UNDP, 2014)

It is important to recognise for this study that in both regions, women are in general more engaged with food crops and men are better informed about cash crops and trade related issues (Höhne, 2015). Activities that include external inputs or farming equipment like pesticide applicators are often carried out and owned by men. Keeping cattle is also usually a male responsibility (Maeda-Machangu, A.D. et al., 1999). Female tasks are typically those that are done from the homestead such as keeping chicken or feeding animals. On the farm or in the home-garden, women are often responsible for more time-consuming activities such as land preparation with traditional hand hoes. In additional to such livelihoods activities, women are responsible for raising children and traditional homework (e.g. cooking, cleaning and washing). This creates a double burden for women (Croppenstedt et al., 2013).

2.2.1 Dodoma regional context

The Dodoma region is located in the central of Tanzania. The literacy rate among the region is low with 62% of women and 72 % of being able to read and write (URT, 2012). Among men, the life expectancy at birth is 51 years and among women 49 years (Knoema, 2006). Dodoma is the region in Tanzania with the highest poverty level overall (UNDP, 2014).

Dodoma region is located in the central plateau. Altitude ranks from 1300 to 1800 meter (URT, 2007a). The region has only one main rainy season that lasts from December to April. This short wet season restricts the crop variation. Almost 600,000 ha are used under temporary mixed crops (URT, 2012). Soil structure is well drained with low fertility (URT, 2007a). 360,000 households are involved in agriculture, whereby 71% are working in crop farming system and 29% are keeping livestock and are involved in crop farming (URT, 2012). Crop farming accounts for the main income source. Dodoma region is populated by the Gogo tribe, traditional livestock keepers (URT, 2012). The NAPA (2007a) reported that maize is the most dominant annual crop grown in Dodoma region (338,843 ha planted area), followed by Sorghum (96,147 ha), Sunflower (83,385 ha), Bulrush millet (80,956 ha), groundnuts (79,024 ha) and Simsim (26,617 ha). Cereals are the main crops grown and account for 71% of the total planted area. This is followed by oil seeds, nuts (25%) and pulses (3%). Root, tubers, Fruits and vegetables are only grown on 0.3% and 0.4% of the total planted area. The main source for irrigation is from rivers, however, only 8,344 ha (1% of total area planted) is under irrigation (URT, 2007a). In Dodoma region 21% of households rear cattle and 14% are using animal power (URT, 2012). The GDP per capita of Dodoma region estimated by the UNDP (2014), is about 690,000 TSh, which is one of the lowest within the country.

The Gogo people have long-standing “traditional” values (Mc Cauley et al., 1992), including overt patriarchal authority within households and village settings. Thus, men often have the power to make decisions about behaviour of other (female or younger) household members. This authority is shaped by past and present economic arrangements as well as through cultural patterns (Rigby, 1980, 1969). The traditional livestock herders formally lived in dispersed homesteads. Those were formed around a man and his sons, who married and brought brides from different families into the homestead. Women’s tasks within this arrangement were to raise food in gardens and other housekeeping tasks. Men were responsible for the family’s wealth, cattle being central to this (Mc Cauley et al., 1992; Rigby, 1980, 1969). The villagization program ‘Ujaama’ in the 1970s reallocated the Gogo people and other pastoralists into villages to facilitate the delivery of governmental services like education and health care. The CSS in this study were formed during this time. People brought their cattle, which ruined home gardens and caused conflicts. The herds were moved and the cattle holdings reduced (Mc Cauley et al., 1992).

In 2012, the in-migrations to Dodoma region were estimated to be 163,320 and out-migrations 506,471. Dodoma has one of the highest share of out-migration rates (6.9%) in Tanzania. The share of urban population in 2012 was 15%. The high share of people living in poverty can be one explanation for the high out-migrations: 56% of the population live in extreme poverty (living on less than US$1 a day) (UNDP, 2014). The average household size in Dodoma region grew from 4.4 in 2002 to 4.6 in 2012. Of all households, 32% are female headed, with 55% of the population aged 15 or above being married and 3.4% widowed. The mean age at first marriage for men is 24.8 and for women, 21.1. Only 12% of all households in Dodoma region have electricity and 8.8% do not have a toilet (URT, 2014). The population structure in 2012 in Dodoma is the following (URT, 2013): 45% aged 0-14 years; 49% aged 15-64; 5% aged 65+.

2.2.2 Morogoro regional context

The Morogoro region is economically advanced in comparison to Dodoma, favoured by being located closer (ca. 200km) to Dar es Salaam, the capital city of Tanzania. The literacy and life expectancy rates are higher compared to the Dodoma region, with 85% of men and 73% of women being able to read and write and a life expectancy at birth for both sexes of 52 years (UNDP, 2014).

Climate favours agricultural production with one short rainy season from October to December and a long rainy season from February to May (URT, 2012). Out of the total number of 298,421 households participating in agriculture, 84% have only crop production as their agriculture activity, which is a high number compared to other regions in Tanzania and SSA. Some 14% are involved in mixed crop and livestock production and 0.4% are occupied in livestock only (URT, 2007a). In Morogoro region, 55% of the available usable land is used for planting annual crops in monoculture and the less common land use type is planting of trees (0.4%) (URT, 2007b). Maize is the most common crop in the Morogoro region, is the main crop in Kilosa district (42% of planted area). Rice is planted on 12.1% of the planted areas and 21% is used for other cereals (sorghum, bulrush millet and wheat). 3,571 ha are used for beans, 1,455 ha for groundnut and in total 1,610 ha for onions and tomatoes. Maize is used as food and cash crop and sesame only as a cash crop. Livestock is kept by only 6% of the households and 3% are using animal power for ploughing (URT, 2012). The GDP per capita of the Morogoro region is about 985,000 TSh, which ranks the region in the mid-range compared with other Tanzanian regions (highest: Dar es Salaam 1,734,842 TSh) (UNDP, 2014).

The district recently suffered under bloody land conflicts between pastoralists and crop farmers. To solve the conflict, the government allocated land to the pastoralists, but the intervention did not help as the areas did not match with stocking rates and had a lack of watering infrastructure (Mutabazi, 2013). Vedeld et al. (2012) highlight another source of conflict within the area, namely, the conflict between farmers located close to or within the area of Mikumi National Park and the park itself, as the national park does not allow farmers and cattle keepers to use the land.

In 2012, the in-migrations to Morogoro region exceeded the out-migrations by 25,463. This ranks Morogoro as one of the regions with the highest proportion of in-migrations (5%). The share of urban population, growing throughout the country, was 28% in 2012. It is estimated that 31% of the population live in extreme poverty, (living on less than US$1 a day) (UNDP, 2014). The household size on average in Morogoro decreased slightly from 4.3 in 2002 to 4.1 in 2012. Of all households, 30% are female headed, with 46% of the population in the region

aged 15 and above being married and 3% widowed. The mean age at first marriage for men is 25.5 and for women 21.8. Only 16% of all households in the region have electricity and 3% do not have a toilet. The age structure 2012 of Morogoro is: 41% aged 0-14 years; 55% aged 15-64 years; 4% aged 65+ years (UNDP, 2014).

2.2.3 Case study villages

Project partners were pre-selected by Trans-SEC. The main characteristics are shown in Table 2. A detailed description is given below.

Table 2 Village characteristics and value assets and physical feature within the four CSS.

Region	**Dodoma**		**Morogoro**	
District	*Chamwino*		*Kilosa*	
Villages (CSS)	**Idifu**	**Ilolo**	**Ilakala**	**Changarawe**
Market access	Low: Mvumi Mission; ca. 20 minutes by motorbike	High: Mvumi Mission; ca. 10 minutes by motorbike	Low: Kilosa or Mikumi ca. 1 hour by motorbike	High: Kilosa ca. 10 minutes by motorbike.
Financial feature	TASAF Aid	Village community bank	CARE community bank	Village community bank
Features				
Physical	4 milling machines. Oxen and oxen carts for rent. Partial mobile phone network. Medical station.	15 solar Panels. 4 milling machines. Groundnut processing Oxen and oxen carts for rent. High mobile phone network. Main road connection to Dodoma & Mvumi.	Main road connection to Kilosa &Mikumi. 7 milling machines. Partial mobile phone network coverage. 6 solar panels.	Electricity in village centre. 5 milling machines. 6 machines for processing timber. Main road to Kilosa. High mobile phone network coverage.
Value assets (Household basis)	2 TVs. 38 Radios. 36 Mobile Phones.	3 TVs. 3 Video / DVD player. 3 Satellite Dishs. 45 Radios 53 Mobile Phones.	5 TVs. 3 Video / DVD players. 1 Satellite Dish. 65 Radios. 77 Mobile Phones.	8 TVs. 3 Video / DVD Player. 3 Satellite Dishs. 70 Radios. 90 Mobile Phones.

Source: Household Survey Data wave 1: (Faße et al., 2014; Höhne, 2015)

Chamwino district, Dodoma

The two case study sites in Dodoma are located in the Chamwino district: Ilolo and Idifu. The Chamwino district has 77 villages and has the lowest literacy rate in the region (URT, 2012). The Chamwino district contains 805,600 ha, out of which 563,920 ha are suitable for agricultural production and 246,821 ha are already used for crop production (Graef et al., 2014). 62,455 households are involved in agriculture (URT, 2007a) 79% of the households within the district have access to crop extension services (URT, 2012). Local soil quality varies due to many different soil types: sandy, reddish and clayey (Mutabazi, 2013). The main marketing problem for farmers is low price for agricultural produce, which results from high transport costs and lack of market information.

Idifu

Idifu is about 20 minutes by motorbike away from the next small town (Mvumi Mission). Compared to Ilolo and according to villages features (see Table 2), Idifu is less developed and more remote. Idifu has 14 sub-villages and is divided into a central village and the outer village parts by a wetland area. This part is flooded during the rainy season. Households are widely scattered. Infrastructure in Idifu is less developed than in other CSS.

Ilolo

Ilolo contains of 12 sub villages, eight of which are central sub villages and households live very close to each other. Ilolo is located closer to Mvumi mission than Idifu, reachable on foot or bicycle. Ilolo is situated on the main road to Dodomo via Mvumi region, thus, public transport is available, even though infrequent. Possibly due to its accessibility, several non-governmental organizations already implemented projects to support villagers and village life. For example, Oxfam donated a village office. Electricity will be available to some households in near future, with installation of pylons taking place during fieldwork in 2015.

Kilosa district, Morogoro

The two study villages are located within the Kilosa district: Ilakala and Changarawe. In Kilosa, larger areas are planted with annual crops during the long rain season. Compared to other districts in Morogoro, Kilosa has the highest practice of annual crops in short rain seasons. It contains of 173,223 ha of usable land and a planted area of 138,275 ha. On average, one household cultivates 2.1 ha (URT, 2007b). 63% of the overall sweet potato planted area in Morogoro is located in Kilosa district, which accounts for 3,251 ha of actual planted area (URT, 2013). The biggest problem for farmers within the region was reported to be low prices because of open markets. Within the Kilosa district, the majority of farmers utilize family land acquired through inheritance. Especially next to privatized areas, land is scarce. The land is generally fertile, however, soil quality declined due to nutrient mining and persistently limited use of organic and inorganic fertilizer (Mutabazi, 2013). More than 50% of households receive crop extension services (URT, 2012).

Ilakala

Ilakala is more remote compared to Changarawe, but situated between Mikumi and Kilosa, which are both small bustling towns with busy markets. The area is hilly and infrastructure, television and telecommunication reception poor. The village has six sub villages. Around 40 different ethnic groups of different religions (Christians and Muslims) live together in peace

in the villages. The Mikumi national park is close and villagers decided to preserve nearby forest as a “village reserve”.

Changarawe

In contrast to the other four CSSs, households in Changarawe have easy access to the town of Kilosa, which is reachable by motorcycle within 20 minutes. The village is centred around the main road to/from Kilosa. Unique to the CSSs, electricity is available in the village centre and in some other households. A river, flowing all year, passes by the village. The village is surrounded by a forest that is not preserved as yet. Changarawe has five sub villages. Of importance is that many farmers in the sub villages “Estate” and “Madisni” have land which was allocated to them in 2011 by a governmental program. However, this was only 2 acres and the government is now planning to take away the land in the frame of the SAGCOT initiative. Thus, Changarawe villagers face extreme uncertainty regarding their access to land.

Comparing physical features and value assets of the four CSS, clearly Idifu can be estimated as being the most underdeveloped and poorest village. Taking value assets of the households as indicator of household wealth, households in Changarawe are the wealthiest.

2.3 Data collection and methods

Fieldwork was carried out between January and April 2015 across the CSS decribed above. In order to get an insight into social and gender structures, as well as to support farmers in implementing innovation processes, 21 participatory group discussion sessions were conducted with three2 collaborating farmer groups, including a total of 43 participants. In order to be able to compare results among several groups, nine one-day sessions with Trans-SEC UPS groups, involving a total of 80 participants were held. In addition, seventeen un-structured interviews with participants and villagers support the findings. The interviews contained information about household relations, perceived challenges in the innovation implementation process and opinions on innovation groups. To complement the results, the data from a household survey conducted by a project partner is analysed (Faße et al., 2014). The survey includes information on household characteristics, health status, household economic situation, agricultural activities and more.

Within the participatory sessions, 12 different communication tools were used for facilitating in-group discussions. All communication tools were conducted in all villages at least once to support comparability of the findings. Sessions and interviews were held in English and translated into Swahili with the help of a translator. Answers in Swahili were translated back into English.

The prevailing goal of the workshops was to support farmer groups to reflect on their current situation in order to enable them to self-select an innovation within their agricultural production process for implementation. Thus, there was the need for a methodology that supports social learning for self-identifying problem situations, as well as for exploring possible future innovation situations. Hereby, current problems, possible solutions and visions of the farmers were put into context. Outcomes and challenges of different future innovation scenarios were explored. Participatory scenario building (PSB) was implemented for this purpose (Kowalski et al., 2009; Walz et al., 2007; Wollenberg et al., 2000).

[2] The group that had been selected in Ilolo was excluded from participating because the group shrunk to five (related) members following a crisis. After the researchers conducted three sessions, the mutual decision was made that a collaboration was no longer possible.

2.3.1 Participatory Scenario Building (PSB)

The objective of the present scenario exercise was to support the farmer groups to self-identify group-specific, best-fitted innovation processes for implementation. The innovation scenarios were iteratively built up on self-identified problem situations and group visions. PSB helped participants to discover challenges and outcomes of the two preferred innovations, specifically with regard to different social factors. In order to create the two final scenarios, the PSB process consisted of two stages, shown in Figure 3. The aim of Stage 1 was to collaboratively identify major entry points for innovations. The sessions concentrated on problem and solution analysis. At the end, four innovation processes were selected for further exploration with each group. Stage 2 aimed to created scenarios for two preferred, best-fit innovations. At the end, after carefully exploring the different scenarios, the group collectively decided on one (or where possible, an integration of two) innovation(s) to implement. The steps and tools will be explained in detail during the following section.

In sum, the PSB process is designed to: a) identify specific problem situations and related goals of each farmer group; b) analyse the proposed group-specific innovation solutions with a special focus on assessing social and gender relations; and c) support farmers to self-identify the best-fitted innovation process for implementation.

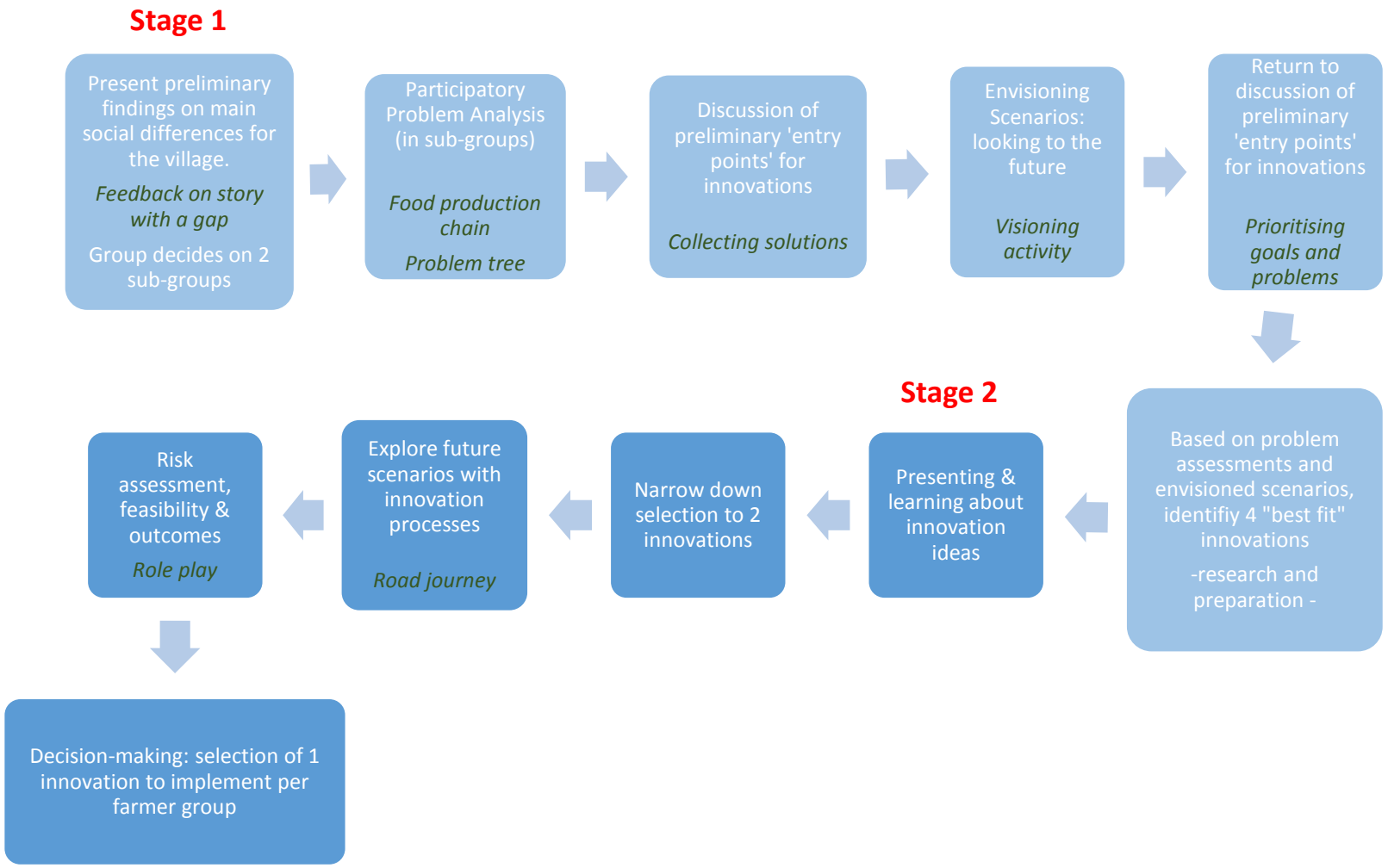


Figure 3. PSB Process; including activities. Source: Schulz 2016

2.3.2 Group workshops and communication tools

Selection of participants (i.e. Farmer Groups)

In 2014, a scoping mission was carried out to gather information on existing CSS farmer groups. Hereby, 12 group leaders were interviewed, who were selected from a farmer group mapping undertaken by MVIWIATA. Out of these 12 groups, four were invited to collaborate in this research- one from each CSS. Selection was based on the following criteria: suitable group size (for facilitation of small group discussions); having an ongoing active agricultural project; social heterogeneity (mixed gender and mixed age); ostensive commitment of members and group, and; inter-group differences in economic status. A crucial point at the time of introduction and invitation, in early 2015, was that members of the groups should be committed to take part in a collaborative learning process. The process was explained in detail to group members and the need for active participation of each member was highlighted. These farmer groups are hereafter termed Collaborative Learning (CL) groups, to differentiate from Trans-SEC project UPS groups.

Implementation

Workshop times and venue were defined in agreement with the group, during the introduction meeting. Because it was farming season, the groups put forward to meet after midday, as the members were busy at the field. Each session took around 3 to 5 hours during a single day, varying in duration due to factors like group size and variable acumen for the tasks. The first stage of the PSB process, shown in Figure 2, required two sessions. The second stage was covered in 3 to 5 sessions. Visual aids -posters and tables- were developed by participants during these sessions. Due to the fact that some (mostly older participants) were not able to read or write, drawings and symbols were sometimes used. Audio recording of each session was taken after the agreement of the group. Photographs were taken of the posters as well as during the activities, after asking for permission. If participants were asked to prepare tasks, translators were requested to check whether the task was understood and fulfilled. However, sub-groups were mostly left alone during tasks to avoid over-determination and influence of facilitators.

All workshops began by participative definition of “ground rules” for the workshop and project. This was put forward as a way to agree on rules and to manage expectations about how to work together as a group. Rules frequently stated included listening to each other, punctuality, turning off cell phones, respect for other members and active participation of all.

Selection of communication tools

Participatory communication tools emphasize co-learning, participation and transformation. For this research, the work of Dianne Rocheleau (1991) on gender sensitive methods for participatory research was influential. In her work “Gender, Ecology, and the Science of Survival: Stories and Lessons from Kenya”, she suggests that researchers can create space for women through participatory activities and storytelling. McDowell (1992) later argued that even though there are many different gender sensitive methods, all insist on forming collaborative relationships. Such methods should break the typically unequal power relations between researcher and informant. In 2005, (Mayoux and Chambers, 2005)Mayoux and

Chambers reviewed new and emerging participatory methods in pro-poor impact assessment. They put forward several accessible tools to:

- Increase participants' understanding of their own situation.
- Improve understanding between participants.
- Reach equitable participation in the analysis and conclusion.
- Strengthen networks for future investigation (Mayoux and Chambers, 2005, p.277)

These approaches to conducting research were highly informative to this study. The combined tools assisted in identifying different social groups among the farmers, which also enabled farmers to separate into appropriate subgroups. Ranking techniques were used to help participants reflect on their own situation. Time trend analysis and mapping techniques helped group members to think about future scenarios and possible challenges. Role play was introduced as a powerful tool to improve the understanding between participants as well as to empower different social groups to raise their voices. Tools were adapted to circumstances after the first sessions with the first group, as time and participation problems arose. The tools are summarized in Table 3, which indicates the number of sessions and participants per CL group.

Table 3: summary of communication tools, including total number of participants and session number

		WENDO-1	**TUAMIHO**	**UPENDO**	
Number of participants		*9*[2]	*17*	*18*	
		Session No.[1]	*Session No.*[1]	*Session No.*[1]	*Topic of session(s)*
Stage 1	**Communication Tool**				
Present preliminary findings on main social differences for the villages	Feedback on 'story with a gap' and capitals differentiation	1	1	1	Defining differences in social factors; limitations in resource access
Dividing into sub-groups	Group discussion	1	1	1	Identifying most important differences among group
Participatory Problem Analysis	Food production chain	2	2	2	Problems along value chains &/or group activities
	Problem tree	2	2	2	
Discussion of preliminary 'entry points' for innovations	Group discussion (collecting solutions)	2	2	2	Ideas on and priorities for innovations
Envisioning scenario	Visioning activity	2	2	2	Visions and hopes of participants/groups
Identify 4 'best fit' Innovation processes	Group discussion (Prioritising visions and solutions)	2	2	2	Favoured innovations
Stage 2					
Presenting and learning about innovation ideas	Group discussion (innovation presentation)	3 & 4	3 & 4	3	Detailed information on innovations
Narrow down selection to 2 innovations	Group discussion (Prioritizing problems and feasibility of solutions)	5	4	3	Resource limitations influencing decision making; group priorities
Exploring future scenarios with innovations	Road journey	6	5 & 6	4 &5	Differences in action, risks, and boundary partners for innovation
Risk assessment, expected outcomes and feasibility	Role play and group discussion on - Challenges - Risks - Outcomes	6	5 & 6	4 & 5	Decision making process within household; relations between social factors
Feedback session	Group discussion and presentations	7	7	6	Clarify and sharing results

1. activity took place within a session numbered 1-7.; 2 Session 1-4: 9 participants, Session 5-7: 8 participants.

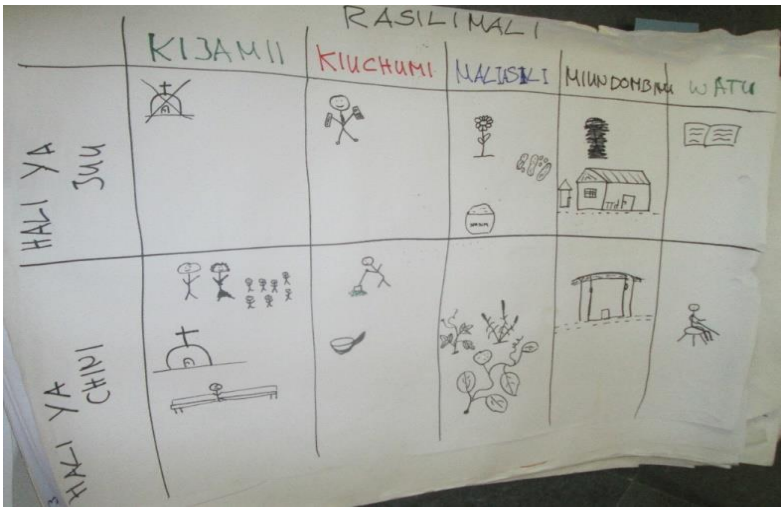
Communications tools, Stage 1, PSB

The first stage of the PSB process aims to gain information about differences in social factors among the group. The information should cover capacities, problems and visions and aims to create social knowledge among participants to help them to make appropriate (context-sensitive) decisions about possible innovations.

Presenting preliminary findings on main social differences for the village

Feedback on 'story with a gap' and capitals differentiation

To explore social and gender differences influencing farmers in their decision-making process, participants had first to define and describe social factors relevant to their group/CSS. In doing so, researchers and participants created an understanding of social structures within the group. It was explained that through previous research visits by Maria Höhne in 2014 and Dr. Pamela Ngwenya in 2014, researchers learnt already that there were many differences between people in the village, as well as many similarities. For example, key differences between resources available to richer and poorer households were identified. First, two (summary) pictures of typical households were then presented, illustrating a typical poorer household and typical richer household. Group members were asked to describe what they see, add anything they think is missing and comment. Second, a summary table drawing from Höhne (2015), sorting the different resources into 'capitals' categories was presented. The table was divided into the following resource/capitals: natural, physical, financial, social and human. The table also differentiated between richer and poorer households. We asked the group to comment on the differences and resources presented. In the end, participants were asked to explain and characterize the major differences among richer and poorer households, especially in relation to their group activities. The activity took about 1,5 hours and resulting posters were placed on the ground in the middle of the group circle. An example can be seen in Picture 1.



Picture 1 Difference in capitals between poorer and richer households; Idifu, 21.01.2015; Source: author.

The presentation rose awareness of possible differences in resource access for group members. Participants realized that different social factors are influencing problem situations, because of the way they affect access to different resources. A summary discussion highlighted that it is important to consider these limitations while making

decisions about future activities and innnovations. Researchers learned about the characteristics rich and poor households and their intersection with other social factors.

Dividing into two sub-groups

A 'game' (*Different and Same)* involved calling out a category or question by the facilitator and all of the participants (including facilitators and translators) sorting themselves into groups relating to the category raised. Examples are the number of languages spoken, age group or the number of children. Some off-topic themes were intermixed with social and agricultural themes, such as ownership of livestock, main crop grown, marital status. The game took about 20 minutes and was played outside the venue to have more space. Such tools can help to create a playful atmosphere for sharing ideas and thoughts (Maiter et al., 2008). The game served to get an initial idea about some differences between the group members. The game was followed by a discussion about main differences and similarities between people and created the basis for the discussing how the group could be meaningfully divided into sub-groups.

The division of the group aimed to strengthen subgroups to put forward their situational ideas and concerns. Conducting selected activities in sub-groups can help to reveal how perceptions on innovation processes are influenced by social factors and if siginificant differences in problems and/or access to resources exist. Facilitators asked participants to think about differences and similarities within the group. Ideas were collected on a poster in Swahili by the translator. Building on this, they were asked to reflect on the poster and tables showing differences. Several points were put forward by group members including age, gender, educational level, type of house (traditional or modern) and number and kind of meals per day. Participants were also asked to reflect on the commonalities between them and the reasons that bring/brought them together as a group. This was again captured on a poster. This was to reinforce a sense of group cohesion despite raising the issue of differences. Afterwards, the groups put forward the most significant difference and based on this, the participants created two sub-groups. Through conducting subsequent group activities in sub-groups, researchers were able to learn in detail about possible limitations due to social factors. Moreover, participants were able reflect on different positionalities. This aimed to emphasise the importance of understanding for the situation of social counterparts, for group success.

Participatory problem analysis (in sub-groups)

Value chain problems

Creating a value chain aimed to learn and talk about problems participants face during their daily tasks in different production activities. The two sub groups were asked to write or draw the problems they are facing in relation to: land preparation, seeding, weeding, growth, storage and marketing. Participants were asked to describe problems according to their own situation within the sub-group. After a preparation time of 20 minutes, all regrouped and the two groups presented their results. A discussion followed. The tables of the sub-groups were combined by writing (or drawing, if necessary) each problem on different coloured cards - one colour for each sub-group - and placing it along the value chain. Together, the group prioritised problems in each step along the chain, based on the severeness according to the

participants. Working first in sub-groups ensures that differences are reflected and may serve as a validation tool.

The activity took in total about 1,5 hours. Discussion and presentation took about 30 minutes and the combination of the tables created by the sub-group took again about half an hour. Posters were placed on the ground in front of all participants for presentations, or (if available) stuck on a wall. The activity formed the basis for proceeding activities. Further, researchers got to know about key activities along the chain and differences in problems. Participants were able to create an understanding of the different problems faced by their social counterpoints.

Problem tree

The problem tree is a helpful tool to create a logical analysis of problems and is widely used in participatory research in developing countries. The problem tree activity aims to determine roots and causes of main problems, as well as identifying effects (Snowdon et al., 2008). Farmers revealed their own perception of their problems (Conroy, 2001). For this activity, grouping the participants was essential to assess whether the groups report different perceptions and prioritisation of problems.

Based on the prioritised problem highlighted in the previous activity, the whole group created a problem tree. Hereby, the coloured cards were placed in front of the participants and a 'root' was drawn on a blank poster. It was explained that there are problems which are the cause of other problems and that identifying them will help to understand problem situations. Through discussion, participants placed problems along the tree and connected them with arrows, to show the direction of causalities. Some problems had more causing problems. The tree helped to think and speak about in depth causes and effects of problems in the agricultural process. The creation of the problem tree took about 45 minutes. Researchers were able to ask if different social factors influence particular problems.

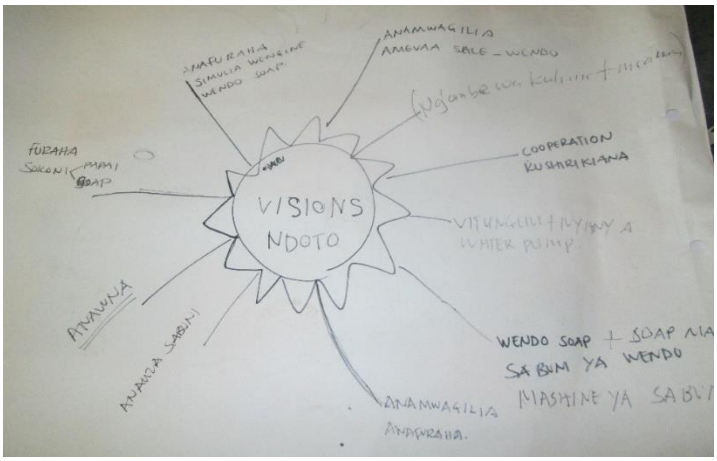
Discussion of preliminary 'entry points' for innovations

Collecting solutions

While the collective analysis of problems serves as a basis for consideration of potential entry points and constraining factors for group innovations, the identification of solutions aimed to draw on farmers' own, existing ideas for innovation. Here, participants put forward their own ideas on how to solve their specific problem situations, encouraging relevance of innovations to the group situation. Based on problems along the problem tree, the two sub-groups were asked to think about possible solutions and write or draw them on coloured cards. After regrouping, the sub-groups were asked to present and explain their solutions. The solutions were written on coloured cards and placed to the matching problem in the problem tree. A discussion on the feasibility of the solutions followed. The whole activity created initial ideas for possible agricultural innovations. The division of the group helped to identify differences in the assumption about possible solutions. Based on the differences in the ideas, the researchers are able to see influences of different social factors on preferences for innovation. Moreover, the capacities and priorities of the farmer group as a whole are made clearer.

Visioning activity

Visioning is a powerful tool gain understanding of desired future scenarios, from the farmers' perspective. It helps to define group goals and talk about actions and steps that have to be carried out in order to reach the visioned scenarios (Wiek and Iwaniec, 2014). The members were asked to close their eyes and visualize themselves in a group situation five years from now. The facilitator created a pleasant atmosphere by describing a situation in which the group is successful and members are happy. Through a guided meditation technique, participants are asked to picture themselves conducting a group activity, with positive associations. Afterwards, in pairs, each person shares their vision. Back in the group, each member was then asked to report back on their partner's vision. The visions were summarized on a poster (see Picture 2).



Picture 2 Group visions; Idifu, 23.01.2015; Source: author.

A discussion of additional goals or elaboration of visions followed. The visioning activity encouarges sharing of hopes and dreams of the participants and to consider how unified the group are in their visions. Visions and hopes were suggested as potential entry points for innovation processes. Next, initial connections were made between the visions expressed and the solutions previously identified in relation to the problem tree, highlighting convergences and divergences.

The activity took about 45 minutes, including discussion. Participants learned more about each other's goals and integrated knowledge about different views on problems, needs, solutions and visions. Further, the group visions help to explore if different members have different/similar group goals. Thus, they were able to learn if different social factors influence farmer's perception of the future.

<u>Identify 4 'best fit' Innovation processes</u>

Prioritising visions and solutions

The prioritization (ranking) of visions and solutions helps farmers to identify four best-fitted innovation processes, which are able to solve their current group-specific problem situations, while addressing group goals. The subgroups were first asked to review and continue the thought process that was initiated by facilitators in the previous session, to connect identified solutions and visions together and think about how implementation might solve their problems. Each subgroup was asked to specifically prioritize only two visions and two solutions, thinking in terms of what would have the most beneficial, problem-solving impact

for the whole group. From this activity, four most appropriate/desired innovation ideas were identified. The process created knowledge about which innovations are preferred by each social sub-group.

Now coming to the end of Stage 1 of the PSB process, facilitators asked participants to collect local information on each of the 4 innovations during the coming week. Researchers were also responsible for gathering information on each innovation. For this, online research and meetings with experts and local partners were conducted within the capitals of each region (Dodoma and Morogoro). This interlude work was essential in order to be able to fully support farmer groups in their decision making process.

Communication tools, Stage 2, PSB

The second stage of the PSB process aims to collaboratively learn as much as possible the previously prioritied innovations, through mutual sharing of information and invitation of local experts. The participants and facilitators learn about the process of implementation of the four proposed innovations and explore possible difficulties. At the end, farmer groups have a detailed understanding of the innovations and are enabled to make a more informed choice. The second stage was conducted over three to five sessions, depending on the general pace of workshop. Each session was held during a single day and took three to five hours.

At this point, facilitators explained to the groups that they will be able to apply for a grant to actually implement an innovation. This had not been introduced before, to minimise bias in participant expressions and expectations during previous activities. Researchers informed participants of the Action Fund, as they would soon select innovations and would need to consider financial feasibility.

Presenting and learning about innovation ideas

As a starting point, researchers presented a poster that covered the main requirements, materials and possible challenges and benefits of each activity. The group was invited to add or comment on the presentation, based on their collected information. For better sharing of knowledge, researchers invited local experts in particular innovations, to join the workshops. As the farmers have greater knowledge about their own situation, they were encouraged to ask specific technical questions to the expert. The conversations helped to develop a detailed picture of the implementation process and the requirements of each innovation. Participants gathered essential information for the decision making process. Researchers and the group spent half a day discussing each innovation in detail, depending on complexity and interest.

Narrow down selection to 2 innovations

Prioritizing problems and feasibility of solutions

The prioritization of problems and the discussion of feasibility of the presented innovations should help participants to narrow down their selection. Reflecting on information learnt in the previous sessions, sub-groups were asked to discuss and choose two ‘best-fit’ innovations out of the four. Sub-groups discussed the specific feasibility of innovations according to their available resources and also reconsidered what would be the most effective strategy to solve their current problem situation and address their group visions. As a reminder, all posters conducted at this point in time were again displayed for participants. This helped the farmers to further concentrate on possibilities of the innovations.

The researchers gathered more specific information on the preferences of each sub group. Group members are well informed at this stage of the process, so the decisions could be taken on the basis of weighing up own possibilities and challenges. Participants also learned about preferences of their social counterpart. The sub-groups were asked to explain the decisions. Possible limitations and comparative advantages in relation to social factors became clear. Discussion is important for the farmers to make the best-suited decision on which innovation can be implemented by the *whole* group. At the end of the activity, participants narrowed down the selected innovations to only two for further exploration. The whole activity took about 30 minutes with each group, who had already been asked to consider options for selection at the end of the previous session.

Exploring future scenarios with Innovations

Road journey

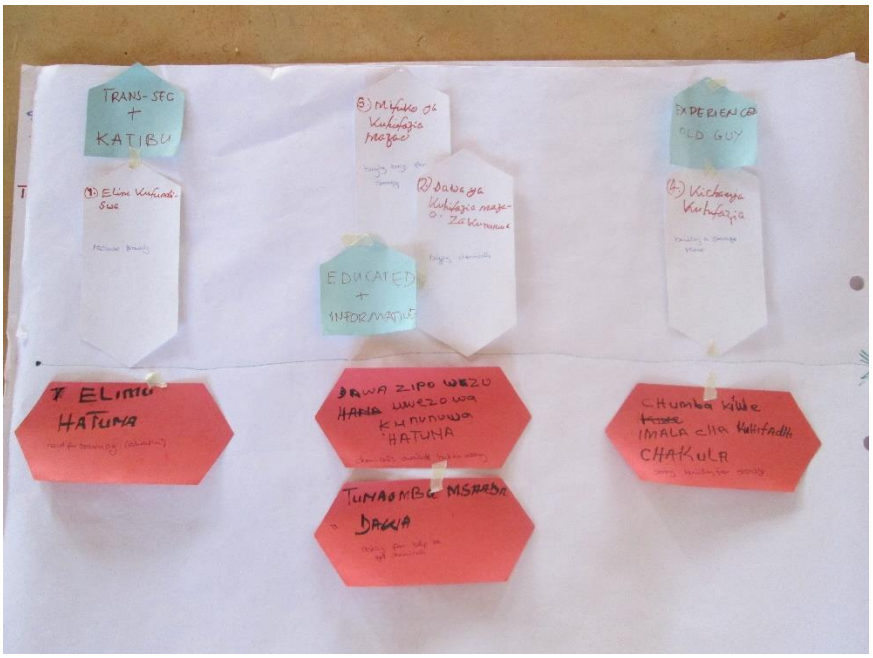
A road journey diagram is a visualised forecasting/backcasting tool that charts a journey from point A to point B over time. In the diagram, the starting point, the ultimate aim, ups and downs, opportunities and obstacles are illustrated and highlighted. This tool is helpful to bring together information about perceptions, expectations and/or experiences of change and development interventions (Mayoux, 2010). Moreover, Road Journeys can be helpful for considering changes over time with people with low or no literacy. For the purpose of this study, researchers used a 'Journey to the future' to chart the ultimate innovation goals of the group and to identify the steps along the way (Mayoux, 2010). The first step in this activity is to identify actions (or steps) along the journey. Next, boundary partners (those who are needed to fulfil the actions) were added. In the end, the group anticipate the biggest challenges along the way and consider which steps may face problems. Groups worked one full day on creating a road journey for each of the two selected innovations.

- Action planning

The two sub-groups were asked to imagine actions that have to be done in order to successfully implement the innovation, thus creating an action plan. For presenting and discussing the different steps, the group came back together. Facilitator and participants combined the actions of both sub-groups into one road journey (see Picture 3). The activity creates a specific, contextualised idea of the implementation process for the innovation. Working in sub-groups shaped helped to compare and crosscheck ideas about how an innovation could be implemented by the specific group. Sub-groups were given 20 minutes to prepare the steps and presentation, discussion and explanation of the steps took about 45 minutes.

- Boundary partners

The purpose of this step is to imagine partners or persons needed to fulfil the different actions. This activity is conducted with the whole group. It aimed to help the facilitator to learn more about work allocations within the group and also to encourage careful consideration of who is needed for the different actions to take place, thus contextualising the innovation process. Farmers should reflect on possible difficulties and limitations that may effect the feasibility of the innovation. The step took 30 minutes.



Picture 3 Short, combined Road Journey of UPS group; red: women, white: men, blue: boundary partners; Ilolo, 12.02.2015; Source: author

- Challenges and risks

Lastly, the two sub-groups were asked to select two actions along the road journey that they consider to be the most challenging. This activity was important to gather information about how social factors might influence decision-making, based on their various opinions of challenges and difficulties. The perception about challenges can be a result of limiting capacities or other restricting characteristics. The selected risks created the basis for the following activity.

<u>Risk assessment, expected outcomes & feasibility</u>

Role play

To explore the perceived, most challenging steps along the way, role play was introduced. In its function to reflect on, plan for and evaluate the implementation process, role play can be defined as tool to animate or 'act out' steps along the road journeys (Singhal, 2001).

The task for the sub-groups was to present the action and associated challenges in a drama. For explanatory purposes, a simple story of own experience was told by the researcher. This aimed to help participants thinking in terms of a storyline. The groups were instructed to take their chosen step from the road journey and imagine a typical situation that would make this step difficult. Importantly, the groups were also asked to play the role of the opposite subgroup, (for example, where gender was the dividing factor, men were asked to act how women would handle the dramatized situation).

After a preparation time of 20 minutes and regrouping, the first group presented their role play. Afterwards, the floor was open for questions and the drama was discussed. Although this was not instructed, the discussion was still in the roles of the drama. Sometimes 'roles' often lapsed when the discussion became more intensive. Switching out of roles, the social counterparts were asked to think and comment on realism of the role play. The second role play followed as soon as no open question remained.

Role plays were conducted twice for a problem along the road journey, once for a 'good outcome' and once for a 'bad outcome'. For roleplaying outcome scenarios, sub-groups were asked to illustrate a family, household situation in which the innovation process has been successful (good outcome) or unsuccessful (bad outcome).

The dramas enabled the researchers to learn more about daily activities and relations between farmers. The role play sessions were most important source of information on factors that influence decision making process. Participants made explicit through their role play, how they specifically experience social differences in their own context. Thus, the researchers gathered information about household and family situations and how the decision-making process can work within one family. Moreover, participants were able to see others' perception of them. They further reflected on their own situation and attitudes. Issues which were seen to create difficulties for the implementation process were raised and discussed through the play. Afterwards, the groups were invited to ask questions and make further comments. The activity took about one hour for two role plays. However, this varies with the length of the drama and understanding of the group. Sub-groups were given 15 minutes for preparation.

Feedback sessions

After one week of reflection and preliminary analysis, feedback sessions were conducted with each CL group, taking around 3 hours each and using visual aids. The goal of the session was to present provisional theories and results built through working with the groups. In doing so, facilitators presented posters on their understanding of most prevalent social differences within the three villages and how these differences may influence the decision making process for innovation selection. Feedback sessions allow for input, validation and contestation from the group at this critical stage, to incorporate different views or elaborate on specific details or questions. Thus, these sessions helped the researchers to understand and learn more about social factors and their possible influence on the decision making process. Besides that, facilitators wanted to encourage the groups to think further about their group situation, including possible limitations and capacities in relation to their selected innovations. Participants were asked to reflect on methodological aspects, particularly the role play activities.

Upgrading strategies (UPS) groups

In order to be able to compare decision-making factors across a wider range of several different farmer groups, one-day sessions with pre-existing, project-related 'upgrading strategies' (UPS) groups were also conducted. This helped researchers to gather more information and get a broader picture of the social and gender dynamics within the villages. The results provide supplementary data to the main findings produced with CL groups.

Group selection

Excect for UPS-group 1, no UPS-group had started to implement an innovation at the time of fieldwork. Each group is aiming to implement an agricultural innovation. Some farmer groups did start to have meetings to create ground rules as well as to prepare for implemention of their innovation. Overall, the establishment of the group was the only common activity, up to the time of research. The groups are not self-organised: participants were invited to join based on specific criteria, thus, members were not entirely free to choose an innovation based on their needs and beliefs. Groups were selected by the researcher according to their

planned innovation, to get a helpful mix of different UPS. The chosen groups can be seen in Table 4. Group size varies, which is why researchers asked for 10 members, mixed gender and mixed age, for each meeting. However, researchers often faced the situation of working with more than 10 people. With the help of local contact partners, available groups were informed and invited.

Selection of communication tools

The overall aim for the work with the UPS-groups was not to support participants in the selection of an innovation (as was the case with the CL groups). The purpose of the UPS-group discussions was to gather information about how different members had already made the decision to select their particular innovation. Furthermore, researchers were interested to learn about different social factors within the groups and how farmers' perceive the advantages and disadvantages of the group's innovation activity.

Sessions with UPS groups took up to 3,5 hours. As groups had not yet started implementing innovations, some activities were not feasible or relevant. The tools therefore included only a relevant selection from those conducted with the CL groups, described above. After the first session with the first UPS group, tools had to be adjusted, as severe time problems arose. A summary of selected tools and number of participants is given in table 4.

Table 4 Communication tools for one-day UPS-group sessions, including number of participants, group activities and village.

Village		**Idifu**		**Ilolo**		**Ilakala**		**Changarawe**		
Group activity		Sunflower processing	Sunflower oil processing	Storage	Sunflower processing	Bio-energy	Maize processing	Nutrition	Poultry	Water harvesting
	Communication tools									
Present preliminary findings on main social differences for the villages	Feedback on 'story with a gap' and capitals differentiation		X	X	X	X	X	X	X	X
Dividing into sub groups	Group Discussion	X	X	X	X	X	X	X	X	X
Participatory Problem Analysis	Food production chain	X	X	X	X	X	X			
Exploring future scenarios with their innovation	Road journey			X	X	X	X			
Ex ante impact assessment (including risk)	Role play	X	X	X	X	X	X	X	X	X
Sharing reason for choosing innovation	Group discussion	X	X	X	X	X	X	X	X	X
Number of participants		*11*	*6*	*7*	*8*	*5*	*8*	*13*	*12*	*10*

2.4 Data handling and analysis

2.4.1 Qualitative content analysis

Translations and transcripts of audio files were done for selected sessions by one Tanzanian translator, mainly role plays (see Table 5). For un-transcribed sessions, the English translations done by the translator during the sessions were noted by the researcher and completed the analysis. The following tools were selected to be used for deeper content analysis in the following sections, as they contain high quality information on difference analysis (especially division into two sub-groups), problems value chain, visioning activities, selecting innovations, road journey and role play. Informal interviews, UPS-Group sessions and feedback seminars were used to supplement findings. The primary text document thus consists of information transcripts, notes, reports and unstructured interviews.

Table 5 Complete translated and transcript sessions.

Village	Tool	Date	Group	Role play content[1]
Idifu	Role play	05.02.15	WENDO-1	Road journey: Soap making
	Feedback	30.03.15	WENDO-1	
	Role play (UPS Group)	09.02.15	Sunflower growing	Implementation challenge
Ilolo	Interview	13.02.15	One Member of sunflower oil processing	
	Role play (UPS-Group)	13.02.15	Sunflower oil processing	Challenges for innovation implementation
Ilakala	Feedback on 'story with a gap' and capitals differentiation	20.02.15	TUHAMIO	
	Role play	12.03.15 & 13.03.15	TUHAMIO	Road Journey: Receiving training on vegetable production; Road Journey: Buying a pump.
	Feedback	02.04.15	TUAMIHO	
	Role play (UPS-Group)	17.02.15	Bio-Energy	Challenges for innovation implementation
	Role play (UPS-Group)	18.02.15	Maize shelling	Challenges for innovation implementation
Changarawe	Role play	17.03.15 & 18.03.15	UPENDO	Road Journey: Receiving training on vegetable production; Road Journey: Bike renting business.
	Feedback	01.04.15	UPENDO	
	Role Play (UPS-Group)	26.02.15	Nutrition	Positive and negative outcomes of innovation implementation
	Role Play (UPS-Group)	27.02.15	Poultry	Positive and negative outcomes of innovation implementation
	Role Play (UPS-Group)	28.02.15	Water Harvesting	Positive and negative outcomes of innovation implementation

1 for detailed information on role play content see Table 13

To categorize and sort data, coding techniques were used with the help of the software (R) RQDA. Hereby, codes were applied and categorized in code categories. This helped with a number of repeating text elements, thus, an overview of specific topics is ensured. The structure of the following results is inspired by the code categories and follows the content and meaning. The codes system for transcripts, reports and notes is as following: social factor_ (e.g. women), capital (e.g. physical). Each social factor obtained and each capital defined in the literature is combined. This sums up to 16 codes for 4 social factors and 4 capitals. Additionally, codes for preferred innovations are included. The crucial topic of gender is covered by an extra code. The results are summarized in tables and described in text. By incorporating quotations, participant's views are emphasised.

2.4.2 Quantitative analysis

The use of quantitative data completed the analysis. With the help of a project related household survey, conducted in 2014, the overall situation of farmers and their characteristics can be described and put into context. A number of descriptive statistics are used to support qualitative analysis. The socio-economic structure of the four CSS is displayed. For this, the statistic program STATA (Version 14) was used.

3. Results

According to the research objectives, the results will be presented as following: first, based on household survey data, a short description of socio-economic factors in the three CL villages is given. Afterwards, the categories rich and poor[3] are defined and characterised, based on participant's descriptions during group workshops. Next, capitals and capabilities relating to the defined social factors are elaborated. Here, the link to innovation decision making is made. Semi-structured interviews, interpretation of workshop activities- specifically role plays and feedback sessions- and discussions during workshops are interpreted and put into context. Quotations are used to highlight findings.

3.1 Quantitative analysis of socio-economic factors

This section draws upon statistics generated with data contained in the baseline survey conducted by project partners (IUW, SUA, ARI, 2014) from January to February 2014. The survey includes information from 450 households in Dodoma and 449 in Morogoro regions - both regions consist of two CSS and one control village - accounting for 4,326 individuals (Faße et al., 2014). This section aims to present information on how social factors correlate with wealth indicators of farmers. Being 'poor' and being 'rich' has been determined to play a major role in the innovation decision making process (Cicek et al., 2008; Feder et al., 1981; Franzel, 1999). Following a livelihoods framework, five capitals are explored in a descriptive way, namely social, financial, natural, physical and human capital.

The survey data helps to define and characterise gendered and socio-cultural patterns of difference in the four Trans-SEC CSSs. An overview of the socio-economic structure of the villages[4] is given in Table 6. Results on income are adjusted for purchasing power parity (PPP$) in 2014. The PPP allows to compare and translate incomes to the US Dollar.

Survey results indicate that the majority of household heads within the villages are male. The highest share of female household heads can be observed in Idifu (25.3%). The age groups were chosen in line with the participant's definition of young and old. Thus, people under 50 were classified in the younger groups and above 50 into older groups. The group under 15 can be seen as school age. In Idifu, the majority of people are Christians (99.4%). In Morogoro region, Muslims are more prevalent than in Dodoma region (41.6% in Ilakala; 48.8% in Changarawe), balancing with the share of Christians. The average school age is not outstandingly different between genders within the village. Noticeably, the more developed village (Changarawe) seems to have the highest mean school years, especially among men (5.9 mean years). Idifu has the lowest share of mean school years (female: 4.6; male: 4.7). Looking at the average monthly per capita income per household (in PPP$), Changarawe has the richest citizens, with a mean p.c. income per household of 27.4PPP$ among male headed households. In Ilakala, 7 households are unusually wealthy, compared to the other CSS and the village mean. Here, two exceptional households have a mean monthly p.c. income per household of 584.6PPP$, in contrast to Changarawe with a maximum figure of 192.0PPP$

[3] Rich and poor households are co-defined by participants during workshops. The terms rich and poor relate to socio-economic conditions of households, including income and assets, as well as access to resources. A detailed description of the different characteristics will be given in 4.2..

[4] Because there is no CL group in Ilolo, it will be excluded from analysis on villages basis. However, UPS-group sessions and interviews from Ilolo will be used for interpretation as they complement analysis.

and Idifu 195.2PPP$. Thus, those 7 households in Ilakala are excluded for better comparability of the CCS context. The gap between male and female headed households is not significant in all three CSS. Idifu has the lowest average of mean monthly p.c. income(14.6PPP$).

Table 6 Socio-economic structure of CSS

Sample Population	**Idifu**	**Ilakala**	**Changarawe**
Female	50.8%	49.7%	53.6%
Male	49.2%	50.3%	46.4%
Total[1]	*781*	*668*	*660*
Gender of household head			
Female	25.3%	16.7%	22%
Male	74.3%	83.3%	78%
Total households[1]	*150*	*150*	*150*
Age group			
0 – 15	52.1%	44.9%	41.3%
16 – 50	35.1%	43.9%	43.8%
51 – 99	12.8%	11.2%	14.9%
Religion			
Christian	99.4%	57%	50.6%
Muslim	0.1%	41.6%	48.8%
Atheist	0.5%		0.6%
Traditionalist		1.3%	
Mean school years[5]			
Female	4.6	5.3	5.2
Male	4.7	5.2	5.9
Mean monthly p.c. income [6]			
Female HH	14.1	25.3	24.0
Male HH	14.7	26.9[2]	27.5
Overall	14.6	41.8	26.7

Calculations based on data of the Trans-SEC household survey (baseline survey 2014)

[1] Total number of individuals included in the HH survey and villages.

[2] excluding 7 anomolous households who together have unusual high mean income of 350 PPP$, which would bias the distribution.

Examining incomedistribution within the CSS gives an interesting picture. In Table 7, we can see that the highest share of people living within the lowest quantile p.c. monthly income can be observed in Idifu. From this picture, Ilakala has the highest share of people living with more than 35PPP$.

[5] Excluded children under 6 years; counting also current school year.

[6] Of household; in PPP$ (2014).

Table 7 Quantile of p.c. monthly income per household, by CSS.

Quantile p.c. monthly income in PPP$ (per household)	**Idifu**	**Ilakala**	**Changarawe**
0 - 35	93.1%	69.1%	77.7%
35< - 90	6%	21.5%	16.2%
90< - 145		4.7%	2.1%
145< - 200	0.6%	[1]	4%

Source: Calculations based on data of the Trans-SEC household survey (baseline survey 2014) 1 4.7% hold over 200 PPP$ monthly p.c. income (7 HH).

3.2 Collaborative learning group profiles

The three CL groups who participated in the full PSB process are introduced in Table 8. These data were elaborated from previous research by Ngwenya (2014) as well as through a follow up study by Fernandez (2016).

Table 8 Overview of collaborating groups.

Village	**Group name**	**Description**
Idifu	WENDO-1	WENDO-1 is a group of 13 members, aged from 20 to 60+ (Average age 57,9 years). The group is composed of 6 men and 7 women. The group shares the use of a plot and they cultivated approx. 40 papaya trees for the purpose of income generation and health, at the beginning of the research. At time of research they had planned, prepared, planted, fertilized and irrigated the trees together and were interested in developing further activities to complement or improve this project. The self-reported income of the group[7] is 2,1 on a scale of 1 (poor) and 5 (rich). Average years of education is 4,5 years.
Ilakala	TUAMIHO	TUAMIHO is a group of 17 members, aged from 20 to 60+ average age 44,1 years). The group is composed of 8 women and 9 men. The group shares the use of a rented plot and they are cultivating tomatoes for the purpose of income generation. In 2014, they successfully harvested. In 2015, at time of the research, they continued growing tomatoes and also expanded and grew maize. TUAMIHO was interested in developing their production to improve their income. The self-reported income of the group is 2,5 on a scale of 1 (poor) and 5 (rich). Average years of education is 6,6 years.
Changa-rawe	UPENDO	UPENDO is a group of 20 members, aged from 20 to 45 (average age 33,8 years). One member is around 60. The group is composed of 10 women and 10 men. The group shares the use of a rented plot and they are cultivating bitter tomatoes for the purpose of income generation. UPENDO was interested in developing further activities to complement or improve this project. The self-reported income of the group is 3,5 on a scale of 1 (poor) and 5 (rich). Average years of education is 7,3 years.

Source: Introduction meeting: WENDO-1: 21.05.15, TUAMIHO: 16.02.15, UPENDO: 15.02.15; completed by Fernandez, (2016) and Ngwenya (pers. comm. 2014).

[7] Group members reported their incomes using a Likert scale from 1 to 5 based on drawings depicting a poor (1) and a rich (5) household according to the description facilitated in a previous participatory exercise (Fernandez, 2016).

All groups consist of both genders, have an active collective farming activity and all members are small-holder farmers. Besides that, there are no other defining similarities between the groups. First of all, the age structure is quite different: WENDO-1 in Idifu is a group dominated by older farmers (average age: 57,9 years). TUAMIHO contains a more mixed group (average age 44,1 years) and UPENDO is the youngest group with only one member around 60 years (average age 33,8 years). We can classify Idifu as poorest group (mean self-reported ranked income (0-5): 2,1) and Changarawe has the richest members (mean self-reported ranked income (0-5): 3,5), which is consistent with the quantitative analysis at village level. The group compositions also reflect the wider CCS literacy rates (measured by years of schooling) as WENDO-1's average years of schooling are 4,5 years, TUAMIHO's 6,6 years and in UPENDO, the average years of education are 7,3 years.

The differences between the groups can also be seen in terms of their activities. Idifu had started their papaya production by planting around 40 trees, at the time of the research. UPENDO grew bitter tomatoes in their first season. TUAMIHO seems to be most experienced, due to their second season of cultivating and selling tomatoes. The crops are representative of those prevalent in the respective regions.

3.3 Definition and description social factors

The previous section indicates some of the obvious social differences between the farmers in this study. Understanding how social factors influence the capitals and capabilities of farmers is important, as this shapes the context of innovation decision-making processes. As such, in this study, activities undertaken during the Stage 1 of PSB concentrated on the participative definition and description of social factors with the farmer groups across the CSS. Results from feedback on 'story with a gap' and capitals differentiation[8] and the prioritization of problems, solution and visions, are now presented.

3.3.1 Description of poorer and richer households

The *Feedback on 'story with a gap' and capitals differentiation* activity involved two pictures (richer and poorer households) and a resource table. The pictures and tables are illustrated based on observations from previous research made by Höhne (2015) and Ngwenya (personal communication, 2014). Thus, the table summarizes the differences in resource access between poorer and richer[9] households, in terms of the following capitals: Social, Financial, Natural, Physical and Human (see Table 10 and 11).

The description of the household pictures can be seen in Table 9 (combining all CSS as they were not significant differences in the general descriptions and characteristics).

[8] Including food production chain and problem tree
[9] Poor has been defined by the groups as having one meal per day.

Table 9. Household picture description.

Picture	**Material Descriptions** (i.e. what they have)	**Common social characteristics** (i.e. who they could be, what they could be doing)
Poorer household	- Only food crops cultivated; - Only one meal per day consumed; - Traditional building (e.g. grass roof); - Toilet far from house; - No bought furniture - Traditional tools (axe or hand hoe)	- Elderly; - Alone; few friends or social contacts; no help; - Widowed; - No education and no plans for life; - Undertake casual labour, thus have limited income; - Dependent on agriculture; - Children not in school; - Struggling to find food; - Drinking alcohol; - Face many hardships in life; - Tired; - Dependent on richer persons.
Richer household	- Higher financial capital (have cash); - Modern house (eg. Iron sheets for roof); - Both cash and food crops; - Extra house for chicken; - Solar panel; modern furniture; toilet inside.	- Family-oriented; - Business person- perhaps retired; - Employed as teacher, village head, or other; - Have many friends; - Happy; - Has help through a farmer group.

Source: Feedback on 'story with a gap' and capitals differentiation: WENDO-1: 22.01.15, TUAMIHO: 19.02.15, UPENDO: 02.03.15.

The descriptions of poorer and richer households draw a general picture of the common differences observed between people in the villages, from a farmer perspective. On the basis of the *Feedback on 'story with a gap' and capitals differentiation,* it was suggested that elderly people[10] and women living alone are especially vulnerable to poverty and are especially likely to live in what was characterised as a "poor household". Participants characterize poorer households in the following quotations:

Older man describing picture of poorer household:

"Maybe the person is someone who is old and alone, so he has no one to help. It could be a woman who is separated and lives alone". (Idifu, Story with a gap; 21.01.15)

Man:

"The poor picture can be an old person, but it could be anyone else, as well. In our village, poor are mostly old people and they are always lonely." (Ilakala, Story of a gap, 18.02.2015)

Man:

"Most poor people in Ilakala are old people." (Ilakala, Feedback, 02.04.2015

On the other hand, richer households tend to have a family including wife, husband and children. When a poorer households consists of a family, they were said to be likely to have many children (up to 10).

[10] To be old is co-defined by participants in all CSS as to be over age 50. Being younger are people under 50.

The resource table complimented the "story with a gap" activity, to get a sense of how the described differences between richer and poorer are embedded in their capitals and capabilities. An overview is given in Table 10 and 11[11]. Here, it became clear that poorer households are heavily dependent on agriculture and casual labour. They often possess only small areas of land and cultivate only food crops for own consumption, using only traditional tools (e.g. hand hoe, axe).

Woman

"If you only use a hand hoe, it is difficult for people who have more land [to be able to cultivate the area]." (Ilakala, Resource Table, 17.02.2015)

The quotation indicates that it is not possible for poorer people to cultivate larger area of land if it would be available to them. Besides that, in order to be able to generate an income (when in need of cash or food), poorer people are often forced to work for richer farmers on their fields. This trap has been often defined to be the biggest conflict for poorer households, as it is difficult to be employed and at the same time cultivate own land. Participants report that poor people are sometimes being paid in food, not in cash. This is where the vicious circle begins for the poor: as they have to work for food, they are not having time to take care of family fields and crops. Consequently, their own fields are not cultivated and cannot be harvested (or only some of it). Thus, the person is stuck in a trap, as he/she will have to work again for food for richer people. In Ilakala, fields are often damaged through cattle which makes it even more harder for people without enough time to cultivate land. In Changarawe, the poor often have to travel far to find work, which is again limiting their time. The following statement is underlines this vicious circle:

Man

"The poor have to spend too much time working for the rich. This is the problem. They are not having time to take care of their own land." (Ilakala, Feedback on 'story with a gap' and capitals differentiation; 19.02.15)

Moreover, educational deficits (fewer years in school) and alcohol problems are also restrictive of human capitals. Educational deficits can be explained by the fact that schooling is relatively expensive in Tanzania. Moreover, some schools are of better quality than others. Besides that, children from poorer household were reported to struggle in school because they are stressed and hungry.

Participants reported that they are sometimes able to cultivate small gardens around their houses. In all CSS, poorer people live in traditional houses out of mud with a grass roof. Houses only have small windows and often no secure door. Reflecting high exposure to health hazards, poor people sometimes do not have a toilet or a mosquito net. They are cooking at open fire places or on traditional stones with firewood inside the house. For sitting and sleeping they are having small, traditional furniture. Around their houses there can be some fruit trees, but not usually more than ½ acre yard around their houses. Some keep chickens.

[11] The information shown in Tables 9-11 was obtained through open discussion of what it is like to be rich and poor in the villages. The data are based on participant's choice of description and attributes (rather than pre-defined indicators).

Picture 4 Poorer Households House in Idifu; Source: Ngwenya, 2015.

Social connections are often difficult to maintain for poorer households. In Idifu, the poor are sometime pushed away and not allowed to join farmer groups, because they are financially constrained and/or often drunk, which both could complicate successful group work. The social isolation of poor is an exacerbating problem for them, as the village community acts like a social insurance scheme (only) to those who can participate. The result of social exclusion is that poorer people seem to have no voice in public authorities and village councils. However, this argument of participants cannot be generalized, as facilitators observed profound relationships between members of farmer groups, which in Idifu, perceived themselves as very poor.

Richer households, on the other hand, are able to cultivate large areas of land (15-14 acrse) and grow food and cash crops. They can hire workers and have a lot of social support within the village. Farmers explained that richer people are having more “friends”, which means, more help. This makes it easier for them to cultivate large fields. For their cultivation, richer households often hire tractors and use modern tools. Besides their agricultural activities, they often have additional income sources like small shops. Often, they keep livestock. Richer people in all CSS usually live in modern houses constructed with bricks, with an iron roof, windows and a secure door. They have modern furniture and in Changarawe, are likely to have a TV and/or a fridge. In Idifu, richer people own solar panels and in Ilakala, richer people have a fenced yard, perhaps with a play area for children.

Table 10 Differentiating capitals table, richer households

	Social	Financial	Natural	Physical	Human
Richer households					
Typical for all	- Marriage: often couples (man and women), with children. - May belong to a formal group open to wealthy people only.	- Produce cash crops to sell. - Have their own transport, which they also hire out for cash. - May own additional small business that generates extra income (e.g. shop). - May be formally employed. - Employ farm workers.	- Access to a large area of land (15-40 acres) to produce cash crops, food crops and may also keep livestock.	- Own a house of bricks, with windows and manufactured doors, a roof of iron sheets; 6 rooms, a toilet with tank. - Own a motorbike. - Own furniture.	- Typically, a middle aged couple with adequate labour power - Education of children, seen as way to make long-term investment in the family.
Typical for Idifu (Dodoma)	- Likely to be group member, e.g. in church.	- Income from employment. - Access to credits through saving and credit group.	- Trees in yard: mangoes, baobab, banana. - Farm very far from Idifu.	- Solar panel. - Ox plough for ploughing the land	- Likely to be mid age or older. - Educated - Anyone, but likely to be teacher, businessmen, livestock keepers.
Typical for Ilakala (Morogoro)	- Likely to be involved in (ruling party) politics. - Member of a group (e.g. saving and credit).	- Have a bank account. - Access to credits through saving and credit group.	- Have inheritance rights to land. - ¼ acre yard around the home with garden. - Flowers in garden.	- Fenced yard. - Play area for children. - Hire tractor for plugging	
Typical for Changarawe Morogoro)	- Man can have more than one wife.	- Eventually income from small shop. - Renting extra land. - May own multiple plots in different places.	- Food crops in home garden. - Vegetable garden. - Flowers in yard.	- Electricity. - Small yard with kitchen and play are for children outside home. - Fridge and TV; flash toilet, garage. - Pump in yard.	- Small shop keepers - Attended secondary school. - Employed in an office.

Source:(Höhne, 2015; Ngwenya, 2014); completed with own research: Feedback on 'story with a gap' and capitals differentiation.

Table 11 Differentiating capitals table, poorer Households

	Social	Financial	Natural	Physical	Human
Poorer Households					

Typical for all	- Low self-esteem may lead to social isolation.
	- May have a large family.
	- May live alone:
	  ○ Elderly people without to take care of them in old age.
	  ○ Widowed or divorced.
	- May be a woman who is alone.
		- Suffer from scarcity of cash and food, even if they cultivate crops.
		- Therefore, undertake casual work for other richer persons to earn cash
		- Must beg for help.
		- Always in debt, taking loans.
			- Own some fruit trees.
			- Own up to 1-2 acres of land cultivated; up to 2 hours walking distance from home.
			- Only produce food crops.
			- Own up to ½ acre of land around their home.
				- Own a mud house with a grass roof; with 2 rooms; only traditional furniture; may not have a toilet; cook on traditional open fire; no mosquito net.
				- If toilet: outside.
				- May own chicken.
					- Lack of labour power due to:
					  ○ Being elderly.
					  ○ High alcohol consumption
					  ○ Sick or disabled.

Typical for Idifu (Dodoma)	- Not involved in politics. - Often pushed away from groups because financially constrained. - Either be in church or into alcohol.	- Rely on financial and physical help of neighbours.	- Often do not own land (farm). - Maize, sorghum, cowpeas, Bambara nuts and fruit trees around home.		
Typical for Ilakala (Morogoro)	- May be involved in help groups.		- No crops cultivate in yard. - Fields are often damaged through foreign cattle. - Richer take away land and/or damage land of other through cutting trees.		- Less education.
Typical for Changarawe Morogoro)	- Man could have more than one wife. - Could be into politics. - Not many churches for very poor.	- Travels far for in search of casual labour	- Small vegetable garden.	- Extreme poor not even having a bike.	- Problems in school due to stress and hunger, thus less education.

Source: Ngwenya, pers. Comm. 2014; Höhne (2015); completed with own research: Feedback on 'story with a gap' and capitals differentiation.

To summarize, poorer households were mainly characterized as older people or women who live alone. This indicates that villagers perceive these social positions to have a heightened vulnerability to poverty. The limited resource situation of poorer households does not allow them to cultivate large areas of land or cash crops for selling. Poorer people have to work for richer people to obtain an income, which restricts their available time to cultivate their own land. Their social exclusion is pushing them further away from receiving support, thus exacerbating their situation and making it difficult to change course. Richer households are able to hire workers to help them to cultivate large areas of land. Besides that, they often keep livestock and have other sources of income through employment. They are highly connected within the village and receive a lot of social support. Richer households are characterized to be typically middle age and married. These attributes do not significantly differ among the three study villages. Through this activity, poorer people and particularly single female household heads and elderly people, are defined by participants as most vulnerable within the four CSS. The social factors age, gender and wealth emerged as dominating social factors effecting livelihoods.

In the next step of the PSB process, participants were asked to separate into two smaller subgroups, based on the most significant difference among them according to participants own perception and justification. WENDO-1 in Idifu separated by age (young under 50 and old over 50). TUAMIHO in Ilakala and UPENDO in Changarawe opted to divide on the basis of gender.

3.3.2 Prioritizing problems, solutions and visions

Through conducting some activities within sub-groups, researchers were able to further examine if the relevant social factors affected preferences. Table 12 shows how the different subgroups prioritized solutions and visions based on previously defined problems.

Table 12. Problems, Solutions and Visions prioritized by participants; separated by Groups

Priorities	**WENDO-1** **Papaya production**		**TUAMIHO** **Tomato production**		**UPENDO** **Bitter tomato production**	
Prioritised problems, in relation to current group activity	- Weak flowers on tree - Lack of water - Lack of capital for fertilizer and pesticides - Pests of fruit and roots - Retarded growth - Worms in roots - Seedling turn yellow - Poor duration of seeds - Lack of soil knowledge (e.g. on quality) - Shading of leaves - Flower but no fruit		- High costs of renting land - No pump for irrigation - Only poor quality seeds available - Shortage of rain - Pests - No storage for harvest - Lack of transport to next market - No market in village (no place, no reliable buyers, only small buyers) - Broker		- No capital to hire labour and tractor - No security of farm - Lack of capital for seeding inputs - Lack of availability of pesticides and fertilizer - No large-scale customers within the village - High costs for transport to market in Dar es Salaam	
Sub-groups	*Younger*	*Older*	*Men*	*Women*	*Men*	*Women*
Solutions	- Find alternative way to produce manure. - Get education on soil.	- Education on soil and seed preparation. - Alternative way to produce manure.	- Take a loan to buy a tractor. - Buy a pump.	- Education on vegetable production. - Permanent water for the field.	- Training on vegetables production.	- Bicycle rent: generating income to buy farm inputs. - Training on vegetable production
Visions	- Producing and selling soap. - Having ox and cow for milk production.	- Producing and selling soap. - Having ox and cow for milk production.	- Group owns a tractor. - Have a market to sell vegetables	- Group owns a tractor. - Build a good house.	- Having a tractor.	- Having a processing machine. - Owning and maintaining shop for farming inputs

Source: Problem tree, Collecting solutions, Visioning activity: WENDO-1: 23.01.15; TUAMIHO: 20.02.15; UPENDO: 03.03.15

In Idifu, both subgroups chose same visions and almost the same solutions. Researchers observed through this activity that the elder man leading the group has a dominating influence. He defines himself as the visionary who has the ability to motivate people. Facilitators were able to observe him lobbying the younger group in their selection of solutions and visions. Thus, in this case it is likely that the younger group chose their prioritized visions in favour of the group leader rather than reflecting youth priorities. It was remarkable that the younger group only put forward one solution while initially proposing them, namely "buying pesticides and fertilizer". While one can doubt the process of differentiating subgroup priorities, it was suggested that the whole group believed that producing soap was a business opportunity would help them in generating income to buy farm inputs for the papaya production. There was no reason to doubt the group unity on this idea. In group discussion, it was explained that the idea of having a cow and ox for milk production is envisioned as not for today, but for later in the project development. The participants explained their visions in similar ways, represented in the following statements:

Younger man about the prioritized solutions and visions:

"First we will get a machine for making soap. We will sell the soap and get money to buy an ox!"

Older man about the prioritised solutions and visions:

"After we get a machine for making soap, we will sell the soap. With this income we will buy farming inputs for the papaya production."

(Idifu, 26.01.2015)

Throughout the process, facilitators had the impression that younger members want to rush the process. (They wanted to now start with the soap business rather than the detailed planning and assessment suggested by facilitators). Within the discussion, the older members had to explain to the younger group members which steps should come first, if they are able to realize the soap business, if they want to be successful. For further elaboration within the second stage of PSB process, the group jointly decided on prioritizing 'producing soap', 'alternative ways for manure' and 'education on papaya production' for further exploration. Then after the presentations on these innovations, despite facilitators request to select two innovations for further investigation, the group decided they wanted to concentrate only on 'producing soap'. This decision was based on their strong belief that the soap making business was the way forward for the group and would generate income in the long-term. Participants planned to use the generated income to develop their papaya production. The combination of other innovations would be not feasible due to the cost for starting the soap making production, thus the group had already selected their innovation at that stage.

In Ilakala, the sub-groups had some different ideas about their solutions. However, the dream of having a tractor was expressedby both male and female subgroups. Men explained that buying a tractor will enable them to cultivate more land, which generates more income. They argued that they will stay poor using a hand hoe. However, the women's vision of receiving education seemed to be more realistic and the men got convinced. One woman explained:

"The education will affect everything. We will solve many problems at once." (Ilakala, 20.02.15)

In the end, the group discussed which processes could be realizable; for example, buying a tractor would not be feasible in the financial frame of this project. They decided on 'education on vegetable production', 'buying a water pump for irrigation', 'building a market place' and 'opening a shop for farm inputs' for further elaboration within the second stage of PSB process. Research for the presentations revealed that a market place within the village is already planned by authorities. The idea of opening a shop would be beyond the scope of the project, as it exceeds financial funds available. On the basis of the presentations on the four strategies, the group thus decided to further concentrate on 'education on vegetable production' and 'buying a water pump for irrigation'. Moreover, the idea came up to integrate irrigation education into the vegetable production training, if it would be feasible to implement both strategies. With the selected innovations, participants hoped to develop their tomato production to generate sustainable and higher income for their group.

The male and female subgroups of UPENDO, in Changarawe, had quite different ideas. The men dreamed to buy a tractor that would help them in their vegetable production. Women's dreams were to have a maize processing machine and to open a shop for farm inputs. Both ideas would be doable from home and could be implemented into women's daily activities. They explained that they prefer this as women face the problem of limited time due to their responsibilities at home. The women's idea of having a bike-rental business were also supported by such an argument. The women were able to convince the men, through discussion, and the whole group then jointly decided on 'bike rental business', 'education on vegetable production' and 'opening a farm input shop' for further elaboration in the second stage of the PSB process. Presentations on these strategies revealed that the farm input shop would be beyond the financial scope of the project and the group then decided to further concentrate on 'bike rental business' and 'education on vegetable production'. Participants argued that the 'bike rental business' will generate some income to develop their bitter tomato production and that the education should also enable them to be more self-sufficient in their production.

3.4 Relation of social factors to innovation uptake decisions

The following section elaborates on how differences in age, gender and wealth (and the differential capital and capabilities associated with these factors) influenced innovation decisions. The data elaborated for this results are primarily taken from the Road Journey and Role Play activities. Researchers own notes and observations as well as answers from un-structured interviews complement the findings. The results were discussed in group assessment during the feedback sessions held with the three CL groups. Table 13 and 14 provides a summary of all role plays conducted with the CL groups and the UPS groups, including their content.

Table 13 Role Play summary; CL groups.

Group	Sub-group	Role play topic	Content
WENDO-1 Soap-making	Young	Challenge: soap production.	Worried that they forget something or understood something wrong during the training. Solution: Paying attention during training
	Old Men	Challenge: selling the soap.	Young person stole soap on market from an older seller. Solution: Younger group members take over marketing and selling.

	Old women	Challenge: finding a trainer.	If younger people search for a trainer, they are not respected → Trainer cheats and steals money; young went alone without help because they were inpatient. Solution: Older will search for a trainer.
	Young	Challenge: transport	Older persons are not strong enough if something happens on the way to the market. Solution: Young will take over the transport.
	Old Men	Challenge: Advertisement	Younger people wrote posters for advertisement but made spelling and content mistakes. Solution: Older will be more careful and smarter because they have more experience.
	Old women	Challenge: Selecting leaders	Young kept group money and it got stolen. Solution: Bank account.
	Young	Positive outcome	Father earns money with the soap business of WENDO-1 and is able to support son who is unemployed and has a drug problem.
	Old Men	Positive outcome	Son is member of WENDO-1 and he builds a modern house for his parents.
	Old women	Positive outcome	Mother earns money with the soap business of WENDO-1 and hands money to the father. He is able to pay school fees and school material for the daughter
TUAMIHO			
Training	Women	Challenge: Looking for money and trainer	Man works to get money for paying group contribution. Meets an old girlfriend and gives the money to her and lies to his wife about it. Solution: Being very committed to the group.
	Men	Challenge: Looking for money and trainer	Women forget to meet the trainer because they are too busy with other things, so they forget important things. Solution: Being very committed to the group.
	Women	Challenge: Allowance for group activities.	Not everyone was contributing (food for the field-workers) but everyone wants to eat something. Solution: teach themselves to tell each other when something goes wrong.
	Men	Challenge: Using training for themselves and others.	If they get training they should help others in the village. But some are not willing to do it, or understood training wrong. Solution: Being committed to group and their goals.
	Women	Positive outcome	Father is member of the group and through their success he is able to pay for shoes and school books.
	Men	Positive outcome	Everyone in the group is able to fulfil their dreams and make a lot of money to support the family.
Irrigation Pump	Women	Challenge: Have the same idea in the group (being committed)	Leadership is lying to the group because he wants to hang out with his friends and drink alcohol. The group doubts the group commitment as even the leader is not faithful. Solution: Having constitution and laws.
	Men	Challenge: Getting a grant	Donor of the grant has expectations which are not able to get fulfilled by the group. Solution: Being committed to the group.

	Women	Challenge: Buying the right pump	One man out of the group buys a cheap pump and lies to the group and takes the left-over money. Solution: Find someone who is reliable.
	Men	Challenge: Buying the water pump	Donor of the grant is promising the money but never returns. Solution: Finding someone who is reliable.
	Women	Negative outcome	Father is group member and earns a lot of money but only uses them for drinking and gambling. Not supporting family.
	Men	Negative outcome	All male members of group who received money gambled and two loose everything.
UPENDO			
Bike rental	Women	Challenge: Group is committed and ready.	Men are not paying attention and are disturbing within group activities; Not attending meetings because have other activities. Solution: Being very committed to the group.
	Men	Challenge: Receive grant	Women are not able to group contribution because husband does not allow it. Solution: Being committed and inform partner.
	Women	Positive outcome	Father is member of the group and is now able to pay for school fees and good food. Allows his wife to join group as well and to start a business.
	Men	Positive outcome	Women is member of the group and was able to buy a tractor for the family.
Training	Women	Negative outcome	Women is member of group and earns money but husband is cheating on her and spends all the extra money on alcohol and women. Solution: Asking group for help.
	Men	Challenge: Get money.	While collecting group contribution, only a few have some money. Not enough contribution. Solution: Being committed and receive education.

Source: Role play activities

Table 14 Role Play summary; UPS Groups

Village	Group	Sub-group	Role play topic	Content
Idifu	Sunflower growing	Improved stove	Implementation challenge	Too many materials and too expensive; Not all available.
		Sunflower processing	Implementation challenge	Contribution too high; One group member steals income after production
		Household nutrition	Implementation challenge	Too less financial capital for buying more meals per day.
Ilolo	Sunflower oil processing	Women	Challenge: asking for money.	Contribution among group will be too little. Solution: Being committed; ask for help.
		Men	Challenge: Buying machine	On the way to the shop they got robbed. Solution: ask for expert who will buy.
Ilakala	Bio-energy	Young	Challenge: Buying machine	Especially old people cannot pay contribution. Solution: Being educated and motivated.
		Old	Challenge: Need for education	Young people don't treat things like education good because they are inpatient and money drive. Solution: Being educated and motivated.
	Maize shelling	Old	Challenge: Ask for loan	Bureaucratic way very long; members get inpatient and leave group; transport expensive. Solution: education
		Young	Challenge: Collecting contribution	Members struggle to pay, especially old people will not be able to contribute. Solution: Education and understanding.
Changarawe	Nutrition	Young	Positive Outcome	Mother in group and learned a lot; used the training for activities.
		Old	Positive outcome	Women member of the group, received money to husband; Supports family business.
		Young	Negative outcome	Group accountant cheats on the group and takes some money. Solution: need for efficient leadership
		Old	Negative outcome	Accountant of the group run away with money. Solution: change leadership.
	Poultry	Men	Positive outcome	Father is group member and financially supports his family.

		Women	Positive outcome	Widow who achieved to keep 10 chickens after group training.
		Men	Negative outcome	Misunderstanding between members; chicken died; lack of security. Solution: Rules and commitment of member.
		Women	Negative outcome	Misunderstanding between members; Lazy members. Solution: not too many members in group; contract and rules.
	Water Harvesting	Young	Positive outcome	Husband member of group. Able to buy motorbike and send child to school.
		Old	Positive outcome	Wife member of group; Handling out money to husband and he decides to send child to school.
		Young	Negative outcome	Mother group member; Father stole the money while he was drunk. Not faithful to family. Solution: Helping each other.
		Old	Negative outcome	One borrowed money from group and never returned. Mistrust in group. Solution: Being committed.

Source: Role Play activities

In the role play summary tables there are some key (repeating) themes, which are worth highlighting. One is marital conflict and the overall theme of intra-household relations favouring men (especially see role plays with TUAMIHO and UPENDO). The topic of lack of finances to contribute to an investment is equally prevalent in the role plays. Within the UPS groups, the most discussed problem related to group functioning and particularly members who are hindering a farmer group being successful. The different skills and livelihood priorities of younger and older people were discussed several times. Here, the impatience (in terms of financial benefit) among younger people and older people's physical and financial restriction dominated. These key themes further shaped the decision to concentrate analysis on the social factors of age, gender and wealth, presented below.

3.4.1 Age

During the sessions, participants emphasised the specific role of older people within the village. Elderly people were often perceived as having limited access to financial capital. It was raised, for example, that older farmers often are only able to use a traditional hand hoe for their agricultural production due to their limited financial capital, which limits their capability of growing cash crops and cultivating more land. This situation can be linked to another fact that was raised regarding the pictures during the 'Feedback on 'story with a gap' and capitals differentiation' activity: older people are often alone. In the study sites, this can be due to out-migration of the younger family members. The family within the villages works as an insurance system. Thus, being excluded from society (e.g. not having friends or relatives in village; overlooked during community meetings; not invited to festivals) can

create serious problems for older people, as they are not able to access financial or physical support. Moreover, due to the limited amount of help, older people are restricted in time.

The following role play illustrated a situation in which an older woman was asked to contribute to an innovating agricultural process.

(One man and one woman collecting contribution for an innovation process)
Older woman: "Welcome!"
Man: "How are you Mum?"
Older women: (Silence)
Man: "How are you Mum?!"
Older woman: "Fine, I didn't hear you well, sorry, welcome my Grandkids, and please sit down."
Man and woman: "Thanks." (Sitting down)
Woman: "Grandmother, we are coming to collect the contribution for the milling machine."
Older woman: "Contribution? Even now you still ask me for contributions, even though I have contributed a lot during the colonialism period by force. And now, my grandkids are also asking me for contributions? What is this?"
Men: "It is for our group, for the Milling machine. Please contribute, you could sell the Chickens and contribute to us two hundred thousand Tanzanian schillings. This is the contribution we agreed on. Do you remember?"
Old women: "Are you thieves? Can't you see my house? The mud tree house? You are asking me to contribute two hundred thousand by telling me to sell all my Chickens? Which even if I would sell them, it will not reach two hundred thousand! You were sent to kill me directly?" (Very annoyed and chased them away).
(Ilakala, Role Play, 18.02.2015)

Participants explained that the drama expresses the financial restriction of elderly. In the discussion of the drama, farmers argued that this is a typical burden for older people. The fact of being less well-off can be caused by the physical capital deficit, as elderly are often highly constrained in physical energy. Higher energy jobs are the most lucrative ones. Consequently, older people are limited in the job opportunities and recourses. Some participants report that older people in some cases are not able to work at all. The following statements underline the observations:

Woman:
"They don't have money or they don't do any job, which means they don't make money. They don't have energy." (Ilakala, role play discussion, 17.02.2015).

Man about what activities older people could do for making a living:
"Papaya farming because it would be easy to take care of it."
(Idifu, Feedback, 30.03.2015)

Elderly people are thus constrained to choose an innovation process that does not require a lot of energy and includes more 'soft jobs'. Participants reported that light farming activities or keeping chickens could be appropriate activities for the elderly.In sum, the feasibility of innovation uptake for older people is determined by the risk of not being able to financially contribute and having a too little physical energy , as was expressedn raised by an older man in Idifu:

Older man:

"…old people like the groups which have less activities like Wendo (group in Idifu): this is why we have the soap making project, which is more a 'soft job'; hence old people can do better here than joining other innovation projects, for example making timbers." (Idifu, Feedback, 30.03.2015)

Despite the restrictions, older people are seen to have a lot of valuable experience and their knowledge is needed in terms of agriculture production. They are therefore still valued as group members. This is especially the case in Changarawe. The older member explained:

Older man:

"… the system of this group was formulated by the youth, so they took me as their technical advisor; but in the village there are other groups which have many old people." (Changarawe, Feedback Session, 01.04.2015)

The knowledge and experience of the elderly can positively influence group decision making processes about innovations. However, participants reported that elderly are often not motivated enough to start new (innovation) projects. The following statement is taken out of a role play and illustrates this issue:

Man:

"[…] lets mobilise all the people! But the problem is education. It was given to the old people and now look, they can't mobilise their group well. If those trainings were given to us youths, we could go far with this project." (Ilakala, Role Play, 17.02.2015).

The social counterpart to the elderly is the younger generation. Wealthier households were often characterised by participants as constituted by young and active people.

Woman:

"For the youth, it is easier to develop. There are 2 types [of youth] in Ilakala: some want to develop and so grow simsim, others have their daily life and do casual labour and don't care about tomorrow." (Ilakala, Resource table, 18.02.2015)

Some youth see many opportunities and as they have high physical energy, they are able to fulfil energy rich activities, which are often the most lucrative ones. They are able to travel further for paid activities, which can support their financial situation. Due to their capability for generating higher income compared to older people, they are more able to build modern houses, using modern tools and can keep large livestock. Their financial capital is intersecting with, influencing and being influenced by other capitals; for example, physical energy and higher educational status. Moreover, demographically, the younger community is larger and thus they can rely on supporting social capitals such as financial or physical help from their peers.

On the other hand, younger people are seen to be careless about the future scenarios, which can be understood as influencing their stock of financial, social and human capitals. Moreover, such behavioural traits may affect the innovation decision-making of younger people and can effect the success of implementing an innovation. An older woman explains:

Older woman in response to the question, “what would happen if everyone in the group would be young?”:

“It could be tricky because all are strong, but they could do things incompletely, because they can fight or have a contradiction of ideas. Thus, you may find things are not moving on the right way.” (Idifu, Feedback, 30.03.15)

Further, a lot of young participants reported that “other young people” are unpredictable and unreliable in their activities and do not see the need for learning new and innovative practices. Members reported a fear that young people may drop out of group activities. Such active and opportunistic youths can also be time-restricted because of their excess of activities. This issue was taken up in some role plays, for example in the text below which extracts from a play about a group innovation training:

Woman: “Ok, youth, the time has come that we have for us to go for training for the preparation of our project. Making alternative energy.”

Young man: “No, I don’t have time for training. I have to go to care for the oil seed at my farm. Don’t be stupid- those trainings are just sitting in vain for the whole day. You, old people, are just liars.”

Woman: “No, old people are not liar! The problem is you guys; the young people. You put money before everything. The training is very important even for you, so that she [young man’s wife] will have the alternative energy to cook for you!”

Young man: “Stay away from me and my family! That training is important for you, not for my family- stay away, I tell you!”

Woman: “Nowadays, when you tell the youth something, they say ‘simsim’ (Oil seed), as if that oil seed is everything to their lives. You know, when you get this training you save many things, like firewood and reduced time consumption; even those oil seed husks can be used to cook your food. Please let’s go to convince your fellow youths to come.”

Young man: “No, that is just wasting time! People want money by growing Oil seed and selling it.” (Ilakala, Role Play, 17.02.2015)

Reflected by such dramatic statements, it was argued that younger people often prefer innovation processes with fast financial benefit.

In general, innovation processes need some specific training and education. However, the role plays frequently illustrated situations in which younger people were not willing to attend to meetings to fulfil training obligations:

(Younger women are playing a group of younger men)

Woman: Today is the day we had agreed to meet, but no one is coming now.

Women 2: I don’t know. See those people with whom we agreed to meet, they are going on with their own activities. Look at the chairman, he also is going his own way! This is really tricky.

Women 3: Everyone is shouting; no communication; so no one participated to the meeting and no successes were made. (Changarawe, Role Play, 17.03.2015).

Findings relating to the influence of age on innovation processes are summarized in Table 15.

Table 15 Capitals in relation to age: Factors affecting capital stock. Summary of findings

Capital	Age
Human	*Young:* inpatient; time restricted; careless about future situations; energy rich; less work-experience. *Old*: energy constrained high; risk averse; alcohol consumption.
Physical	*Young*: advanced house; modern tools; car or motorbike; cattle. *Old*: traditional house; hand hoe; only chicken.
Financial	*Young:* off-farm income sources; cash crops; higher wage for heavy work; ability to access markets. *Old:* only agriculture as income source; food crops; no insurance scheme.
Social	*Young*: community of youth. *Old*: excluded from society.
Outcome for innovation decision	*Young:* Less patient (quitting implementation); not attending information meetings. *Old*: Only able to fulfil small tasks, not time or energy intense. Financial investments only partially possible. No financial or farming support while innovation is implemented

3.4.2 Gender

Two out of the three CL groups, as well as most of the UPS groups, chose to separate by gender for their activities. When the groups were asked to explain this decision, many answered that dividing into men and women is the "easiest" way, as it was perceived as being the most "obvious" difference among them. However, two groups stated that they are interested in learning about the opinions of the opposite sex.

Separating into gender-disagregated groups enabled gendered differences to be revealed and discussed with the groups. A key issue that emerged was that for women, marital status was a critical factor in relation to innovation decision-making. Married women within the villages seem to be highly influenced by their husbands and so their decisions often reflect the preferences of the husband. One man explains this:

Man:

"Let's speak the truth, let's be honest, you cannot lie. Because [if] you, [a woman,] are in a farm shop [as a proposed innovation strategy], you come home very late in the evening hours and you are a married woman! Do you know who cooks for your children, your husband?! In reality, married women are held by the condition of their marriages; other things… [innovation strategies] we are talking about here…. they are more theoretical. They don't work for married women." (Changarawe, Feedback, 01.04.2015)

Woman:

"[…] because we as women, we have to have the permission from our husbands. So, if you are late [to come home], there are lot of problems. Also they [men] don't talk with us; they just decide simply because they are men." (Changarawe, Discussion about role play, 17.03.2015)

Woman about how they are able to spend time with group activities:

Married Woman: "It could be the same as when I joined the group; he (husband) allowed me. But now; he starts to refuse me going to sell at the women's farming shop."

Facilitator: "What about you, as an unmarried woman?"

Unmarried woman: "No, because she [the married woman] needs time to go and take care of her family and be together with her husband… so she can't be free till to late hours , like us single women."
(Changarawe, Feedback, 01.04.2015)

The quotations show that the capability of a married women to take up an innovation process is thereby determined by their culturally defined role with the family and the intra-household power relations between the married couple. Typically, in terms of decision-making power, the relationship goes in favour of the husband. Participants reported that the husband often influences his wife's daily activities and also determines financial expenditures. Many role plays expressed this situation, for example:

(Women playing a family)

Husband: "I'm hungry, please."

Wife: "Welcome, the food is ready"

Husband: "What kind of meal did you cook?"

Wife: "It's a delicious meal"

Husband: "…Why didn't you cook that chicken?"

Wife: "I had no money and YOU had the money from TUAMIHO group (farmer group in Ilakala,) but you didn't even tell me. Ok, now tell me how much did you get yesterday?"

Husband: "There is no need for you knowing about the money I got yesterday from my group, because it's not your group and the money is not yours, so please shut up! You don't have the right to ask me that!"

Wife: "I'm your wife –you're supposed to tell me everything you do and with your group. I thought we were doing everything as one, so you should tell me how much money you get and where the group money goes to."

Husband: "I have my money and I have my own plan."

Wife: "What about your children; are you not paying the school fees?"

(Child is singing when coming home)

Husband: "What is this child doing?"

Child: "Hi daddy, hi mum!"

Husband: "What is your problem?"

Child: "I've been chased from school, I need a fee and 5000Tsh for examination"

Husband: "I have no money to pay examination fees, nor school fees. Now, I have to go out where young ladies are and sleep with them and give them my money."

Wife: "So now you are not even shy to say it! So you don't want to take care of your family; all of your skills and time you wasted at TUAMIHO is to go to bribe young ladies, to sleep with them! You forget about your family, isn't it?!"

Child: "Now look, I want to do exam for my finals but you, dad, you don't want to help to get my education.Where is your responsibility as my father?"

Husband: "I don't care! go away from here"

Child (Crying)

Wife: "You are a very bad husband. I never knew that."

Husband: "I don't care."

(Ilakala, Role Play, 13.03.2015)

The above role play is melodramatically showing an example of a dysfunctional marriage and irresponsible husband/father. In the discussion, it was highlighted that even though the man is acting selfishly and irresponsibly, the wife does not see herself as able to take the money for food and school fees. On a different occasion, another role play illustrated a situation in which an unfaithful husband received money and similarly gives it away to a lover rather than to using for household expenditures:

(Two women playing a man and a woman)

Woman: "You are my love- please give me all that money.You will find another job tomorrow then you can give it to your wife."

Man: "Ok, I know you and love you." (Ilakala, Role Play, 12.03.2015)

Interestingly, in almost all role plays about family finance situations, the wife kept and hid the money, although the husband is the one who is in charge of deciding how to spend it. When asked about why this is the case, it was suggested:

Man

"Because sometimes we men walk far away, alone. People may rob us and take all of the money. Also, women are taking more care of the family then men. This is why when we [men] get money, we give it to them [women] quickly …before using it for alcohol." (Idifu, Feedback, 30.03.2015)

Continuing with the theme of male infidelity and financial irresponsibility, a group of women in Changarawe played a family in which the father is cheating on the wife and sleeps at different places. Because of the way the husband spends money, the wife is not able to pay the school fees for their children. Moreover, she says to her child:

"I know we cannot develop as your friends do. It is because your father is not sleeping at home. He needs all the money to travel and drink and for other women." (Changarawe, Role Play, 18.03.2015)

These seemlingly dramatized snapshots were used to express and communicate the problems experienced by married women and their children,across the CSS, as a result of a lack of control over household income, most particularly when men behave in the ways

illustrated in these role plays . The group discussions that followed the role plays corroborated the dramatized scenes.

Woman:

"It's true that men are the only ones who can decide what to do with the money, not women. So, for women, this is their special problem." (Changarawe, Discussion about Role Play, 17.03.2015)

Further unstructured interviews with married and unmarried women on this topic revealed that there are married women within the villages who are unable to take up any innovation process because their husband is prohibitive, in terms of either financial support or simply banning their participation. Married women are thus often only able to develop if the husband is willing to support her activities.

The fact that the woman's role is circumscribed by her time-consuming responsiblity for the household and children is crucial in shaping her context for innovation decision-making. Male participants in workshops also argued that women are often "too busy" to concentrate on innovation activities, such as training. Women's daily tasks (married or not)and time contraints can thus influence their decision-making process for innovation uptake.

Reflecting the above contraints, women reported that they favour innovation activities that are doable from home. These are often also supported by the husband. Moreover, home activities are an opportunity for unmarried women as well, who may also face time and mobility constraints also due to their household role (as daughter/household head).

Men often have a comparative advantage on women in terms of their physical strength. In general, they are more likely to be able (and socially accepted) to fulfil strenuous manual work, which is better paid. This is benefitting their financial and human capitals. However, as already indicated, many role plays illustrated a problem of alcohol and gambling among men, or other 'misuse' of funds. Additionally, men themselves reported that they need a lot of time for recovering from heavy work and social time with friends. This effects their available time for innovation activities. Whereas for women, structural contraints relating to gender roles and relations were emphasised, for men, it was argued that individual behaviour traits, including one's own willingness to develop, shaped the context for innovation uptake decisions.

Key results pertaining to gender are summarized in Table 16.

Table 16. Capitals in relation to gender: Factors affecting capital stock Summary of findings.

Capital	Gender
Human	*Women (married):* driven by husband's decision; time restricted; marital status matters. *Men:* alcohol consumption high; risk of gambling; energy rich.
Physical	*Women (widows or single):* traditional house; hand hoe; *Men:* advanced house.
Financial	*Women*: small enterprises possible; depending on husband's income; marital status matters. *Men*: Risk of gambling; cash crops; higher wage for heavy work.
Social	*Women:* women groups; children; widow often excluded. *Men*: socially respected.
Outcome for innovation decision	*Women*: Decision-making process shaped by husband's opinion and behaviour. Financial investments have to be approved by husband *Men*: Time and financial intensive innovation processes critical

3.4.3 Wealth

Wealth can be understood as an overlapping and intersecting social factor, which is often shaped by the age and gender of a person. Poorer people often face problems of time, financial resources and lack of community support:

Woman

"… there are people who are very poor and can't contribute anything." (Ilakala, Discussion after Role Play, 12.03.2015)

Woman:

"Wealthy people have higher chances to get help, as they are able to employ many people to do their activities." (Ilakala, Feedback, 02.03.2015)

Woman (on how rich people get more social help)

"…Especially from their fellow rich friends; it's like a network … rich people like to help each other." (Ilakala, Feedback, 02.03.2015)

Man:

"Friendship means sharing and being convinced with what people can acquire or gain from you. And if you have nothing you will never get more friends." (Ilakala, Feedback, 02.04.2015)

The innovation decision making of poorer people and the sustainability of their activities is influenced by these constraints. Critically, such people are often not able to make financial investments in innovation processes. Moreover, power relations and social dynamics within the village, illustrated in the above statements, highly affect poor people's capability to take up innovations, as the process often needs to be supported by governmental officials or village heads.

The problem of alcohol consumption was also seen to be especially restrictive for poor people, who were described as vulnerable to this habit:

Woman

"richer people drink alcohol, but just a different quality: poor people drink local alcohol while rich people drink modern alcohol. […] the higher percentage *of drinking people are poor." (Changarawe, Feedback, 01.04.2015)*

Due to higher financial capital, richer people can more easily invest in trying new activities. Richer people's capability to allocate time and financial resources freely, with the help of their high social capital, is also enhancing their opportunities to participate in innovation processes.

Key findings pertaining to age are summarized in Table 17.

Table 17 Capitals in relation to social factor wealth: Factors affecting capital stock. Summary of findings.

Capital	Wealth
Human	Rich: Time flexible; less risk averse. Poor: Time restricted; risk averse; less educated; alcohol consumption high.
Physical	Rich: advanced house; cattle; car or motorbike; hired labour; modern tools. Poor: traditional house; hand hoe, chicken.
Financial	Rich: higher income; cattle; off-farm income sources; access to markets; cash crops; self-insurance through community. Poor: food crops; paid in food; no insurance scheme.
Social	Rich: societal acceptance and valued; close social relationships. Poor: excluded from society.
Outcome for innovation decision	Rich: Decision making process is not restricted; Innovation can be freely chosen. Poor: Less time intense activities possible. Financial investments only partly possible. Less financial support for implementation

From the role plays and discussions, supported by interviews, one can conclude that age, gender and wealth are intersectional social factors, which together influences a person's capacity to implement different livelihood strategies and to take up or try out innovations. The different restrictions in capitals and capabilities associated with these social factors influence innovation decision-making.

4. Conclusion

This study aimed to assess possible implications of gender and socio-cultural factors for innovation uptake-decisions of heterogeneous groups of smallholder farmers in four CSS. A comprehensive PSB process including role play activities and involving actual innovation identification and selection decisions was facilitated. The participatory action research methodology allowed for participants to explore, using their own terms of reference, the possible outcomes and challenges of different self-styled innovations. The methodology was designed to enable collective identification of significant social differences within the groups (and within the CCS contexts) and to then make explicit the different perceptions and needs of the farmers involved, thus highlighting how socio-cultural factors shape innovation selection and uptake decisions.

The analysis revealed that age, gender and wealth are critical socio-cultural factors that shape innovation preferences. Elderly people, women and poorer people experience overarching constraints with regard to innovations, particularly where an innovation requires high levels of time, energy or money input. Elderly people have less energy and resources for physical activities. Often having less financial capital, they have to work more for their daily bread and other expenses, which also renders them time-restricted. It was expressed that people who have less to give in terms of time, energy or financial capital, can become socially excluded, further constraining their capacity to participate in innovation activities. The predominantly elderly CL group in this study opted for a soap-making innovation, reflecting their perception that 'light' work to improve their off-farm income was most suitable for their group.

Younger people are seen to be less patient in terms of benefits and outcomes of innovation activities, but due to their higher energy level, they are able to fulfil intensive physical work, affecting their capacity to take up more physically involved activities. The predominantly youthful CL group in this study designed a bicycle rental enterprise, which reflects their desire for rapid financial return.

Role plays showed that female household heads typically face a siginificant lack of time and finance, as they have no partner to balance household and livelihood needs. Married women however are also similarly limited in terms of time (due to household responsibilities) and access to money, often constrained by intra-household power relations that normally favour men. For most women, preferred innovation activities should not be time intensive and should be doable from home. Women in one participating CL group lobbied persuasively for the bicycle rental business, arguing that it would not take much of their time or physical energy.

In terms of innovation processes, it emerged that poorer people often prefer working within a group, as they have more support this way. For many, the fact of being member of a farmer group seemed be a more important benefit than the innovation activity itself. However, as the poorest people struggle more to fulfil their most basic needs, they are highly time restricted and are compelled to undertake wage labour. They therefore have less capacity to participate in group activities and often suffer from *de facto* exclusion.

Sensitive but crucial issues are often not easy to share with strangers. The role plays helped the participants to express their issues indirectly. Moreover, unspoken experience and relations were sometimes obvious for the participants, but not for researchers. Daily social

circumstances, especially typical domestic relations, became clear during the performances. Within the space of research, methods like role play are an opportunity to learn about social processes from the perspective of participants, specific to their context. The demonstration of power relations, especially through role-switching and related debate, helped participants to create knowledge about themselves and their communities. Discussing such power relations is crucial for community based planning of innovation processes, as such issues influence innovation decision making processes and potential outcomes. There were also limitations of the role playing activities: for example, a lack of trust often meant that role plays were easier and better, and more accepted, if the facilitator knew the group for a longer time.

If innovation projects are to target the most vulnerable groups, innovation processes have to consider and ideally, address, their constraining capitals. Active participation of farmers in innovation identification and testing, assisted by PSB processes, can be helpful for developing group-specific innovations that address their livelihood constraints in socially-sensitive ways.

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