Sveriges lantbruksuniversitet
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Faculty of Natural Resources and Agricultural Sciences

Perceptions of Change

– Livelihood Impacts of the Push-Pull Technology Project in South Wollo, Ethiopia

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Department of Urban and Rural Development
Bachelor's Thesis • 15 HEC
Agriculture Programme – Rural Development
Uppsala 2015

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Credits: 15 HEC

Level: First cycle, G2F

Course title: Independent project/Degree project in Rural Development

Course code: EX0523

Programme/Education: Agriculture Programme - Rural Development

Place of publication: Uppsala

Year of publication: 2015

Cover picture: Sorghum fields in Gobeya, photo Salomon Abresparr

Maps and/or images: Salomon Abresparr

Online publication: http://stud.epsilon.slu.se

Keywords: agroecology, Ethiopia, Push-Pull Technology, livelihood.

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Abstract

This thesis explores how farmers in three villages in South Wollo, Ethiopia, perceive the impacts of a particular farming technology. The technology is called the Push-Pull Technology, which is an agro-ecological method to address the problem of stemborer moth and *Striga* weed, which seriously affects the production of the important food crops maize and sorghum. It is agro-ecological in the way that it seeks a holistic solution that is beneficial for the yield size as well as for the environment and the humans involved. Since the technology is developed within agro-ecology, it also needs to be evaluated holistically. As yield increases have been recognised already, this study focuses on how the farmers perceive its socio-economic impacts using a livelihood approach. However, this thesis seeks not to be an evaluation. Rather, it uses qualitative methods to investigate some of the farmers' perceptionsof the impacts of the method. This brings a better understanding of how a technology like this can be received, what values the farmers put to it and how it fits into their livelihoods.

Keywords: agro-ecology, Ethiopia, Push-Pull Technology, livelihood.

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Abbreviations and Specific Words

ADOPT	Adaptation and Dissemination of the Push-Pull Technology
DA	Development Agent, a person that works as an agricultural expert in the *kebele* and manages the FTC
ETB	Ethiopian birr, the currency in Ethiopia.
FTC	Farmer Training Centre, the place for agricultural trainings, often in each *kebele*
ISD	Institute for Sustainable Development
NGO	Non-Governmental Organization
PPT	Push-Pull Technology
PSNP	Productive Safety Net Programme
SIDA	Swedish International Development Cooperation Agency

Berbere	Pepper, a common spice in Ethiopian cuisine
Chat	A crop which green leaves contain narcotic fragrances. The plant is chewed as a drug mainly in Ethiopia and Somalia
Ergo	Yoghurt
Farenji	Foreigner
Injera	A sourdough pancake made of *teff*, the staple food and national dish of Ethiopia
Kebele	The smallest state administrative unit, there is usually a *kebele* for each village, and a city contains of several *kebeles*
Keremt	The main rain season, that for the most of the country is between June and September
Model farmer	A farmer that is elected for his or hers openness to try new agricultural methods
Quintal	A measurement of weight. One quintal is 100 kg, which equals one standard sack of grain
Teff	The indigenous grain, the main ingredient in *injera*
Woreda	District, the administrative unit above *kebele*, several *kebeles* make up one *woreda*

1 Introduction

1.1 Background and Research Objective

The notion of 'agro-ecology' is a rising phenomenon within the global agricultural debate. Although the idea of agro-ecology has been present for several decades, and has evolved in different parts of the world, it is now an increasingly recognised perspective at a global scale. The multifaceted notion has thus resulted in a perspective with wide angles, sometimes departing from separate disciplines taking emphasis on different aspects (cf. Silici, 2014:6ff). However, a common definition of agro-ecology is that it tries to grasp a holistic view on agriculture, meaning the interactions and linkages between plants, animals, humans and the environment within agricultural systems. Agro-ecology is an integrative perspective, meaning that it takes into account the ecological aspects of farming, as well as the social and economic aspects (ibid.).

Since agriculture is often seen as a key element for human development(cf. Silici, 2014:5, Jacquet et al., 2012:7ff), there is an urgent need for moving towards an agriculture that optimises the outcomes for both humans and the environment, in a short and long-term perspective. There are huge challenges to world agriculture today, trying to meet both social, environmental and economical desires at the same time as changes in climate and environment is putting more constraints urging for change to tackle these issues (cf. ibid).My belief is that the notion of agro-ecology can contribute to development strategies, in order to support an agriculture that departs from a perspective that takes into account different interests and thus also recognizes desirable outcomes from different standing points (cf. Silici, 2014:13ff).

In Ethiopia, several development projects within the agricultural sector have been conducted with agro-ecological approaches. Institute for Sustainable Development (ISD) is an Ethiopian non-governmental organisation that has initiated series of agro-ecological projects since 1996. One of their recent projects is called 'Adaptation and Dissemination of the Push-Pull Technology' (ADOPT) and has been conducted between 2011 and 2014 in six *woredas* in the South Wollo Zone of Amhara region in northern Ethiopia (ISD, 2013). The Push-Pull Technology (PPT) is a method using inter-cropping of different plants to prevent two serious pests from attacking maize and sorghum.

The introduction of PPT in South Wollo in Ethiopia has had estimated yield increases of mostly around 50 percent, sometimes even up to 90 percent (ISD, 2015). The environmental aspect of the technique is also regarded, as it is tendered for reducing the environmental impact by being an alternative for chemical pesticides (cf. ibid.). However, as agro-ecology is trying to grasp a holistic view, with human and economical aspects included, the study of the socio-economic outcomes of the project is needed to get a more profound picture of what this agro-ecological project has resulted in. The aim for my study is therefore to contribute to the understanding of how the farmers involved perceive the project, and more exactly, what are their experiences of its socio-economic impacts. Socio-economics is here on the border between economy and social aspects, which link for

example economic improvement with its social impacts. These can be how the improvement is received, how it is interpreted in people's lives and what affect it can have on social relations and values that are not economical, but still formulated, clear and important for the farmers themselves. To capture the socio-economic impacts I will use a livelihood approach, in order to provide a better understanding of how the PPT project fits into the farmers' livelihoods in a broader sense. The research question is as follows: *How can the impacts of the Push-Pull Technology Project be understood using a livelihood perspective?*

1.2 Delimitations

This study is limited by its research question, focusing on farmers' perceptions of the PPT Project in South Wollo. However, there are about 400 farmers that have taken part in the project in this area. Due to time constraints and lack of capacity to handle such a load of data it would take to investigate the perceptions of all these farmers in a qualitative way, there is a need of limiting the study. The limitation has been set to interviews of thirteen informants in the three villages Gobeya, Pasomille and Tessabilima. How the choice of informants have been made due to this delimitation is further discussed in the methodology chapter.

1.3 Outline of the Thesis

After this introduction the methods used for conducting this study will be presented. Then, in chapter three, I will go into the theories and concepts that will be used for analysing the material from the field. Chapter four will further explain the field research context, the characteristics of the area, details about the PPT and a presentation of the informants. With this fresh in mind, I will dive into the results of the field study, parted up in the three following chapters. Chapter five will discover the multifunctionality of PPT, and how the technology fits into the farmers' livelihoods. Chapter six focuses on the sustainable livelihood framework and discusses the findings from the field in relation to the different aspects of the framework. Chapter seven uses poverty as a departure point for discussing how PPT addresses some farmers, while others are left behind. Finally, the points made in earlier chapters are summed up and some final conclusions are made.

2 Methodology

First of all, it is important to mark that the material for this thesis has been collected together with Josefin Årevall, a fellow rural development student. We have together applied and got scholarship from SIDA for a 'Minor Field Study'. The use of 'we' in this thesis thus refers to myself and Josefin, who have conducted all interviews and shared the field study together. We have however written our thesises individually. Thus, the use of 'I' in the thesis refers to my own findings, thoughts and analysis.

2.1 Phenomenology

My thesis has a phenomenological outset, as I am interested in how people perceive their life and possible implications this PPT Project has brought to them. My interest lies within the experiences of the farmers, as the lack of knowledge about the impacts of the project is not about yield levels, but how the project is really received by the people targeted. When applying a phenomenological approach, the actual so to say 'truth' is not important, rather are the views of the people that experience the course of events what creates the reality (cf. Kvale and Brinkmann, 2009:39-43). Furthermore, this is related to a constructivist perspective assuming that there are multiple truths and several versions of reality present parallel to each other, as it is the meaning that is given to it by different people that is decisive (cf. Otto, 2013:110).

2.2 Interviews

To understand the farmers' view, a suitable way to find out their perspectives is to simply ask them. This can be done by interviews, which is the most common method to use when studying society with humans, the individuals, as the outset. By interviews, you get a picture of what thoughts, experiences and interpretations individuals have regarding processes in society (Fägerborg, 1999:55ff, Kvale and Brinkmann, 2009:15).

There are several ways of conducting interviews. As Kjell Hansen puts it, interviews which resembles plain chats or conversations are the best interviews (Kjell Hansen, 2014-02-02). Following this, semi-structured interviews enable the conversation to be smooth and easy-going, and thus resembling an ordinary chat. At the same time, the points or questions lined up for the interview will make sure that the interview will cover everything the interview was intended to do. The flexibility of the interview will enable the talk to also reach points that would never be reached if the conversation was strictly controlled by the interviewer alone. Hence, it allows the talk to go in directions of the informants' own stories and interests, which in this case often is an important contribution to what the analysis later is built upon(cf. Teorell and Svensson, 2007:89-91,).Therefore, I have chosen semi-structured interviews in the belief that they are most effective for getting the material needed.

2.3 Choice of Informants

The informants are nine farmers and four agricultural experts. The choice of informants has been based on the contact we had with ISD, the organization in charge of the PPT Project. The ISD has helped with providing contact to the farmers. To be part of the project for some time, in order to have been focus to some kind of impact from the project, has been the main criteria for the choice of informants. Another criterion of choice has been gender, as we have strived to interview both men and women. Three out of the nine farmers are women, which is a number we were not satisfied with in the first place, but that we later have accepted due to the fact that many of the households are headed by men. In order to be open to differences that could occur due to location, another aim has been to have our informants spread out. The farmers are thus found in three different villages, with three informants in Gobeya, four in Pasomille and two in Tessabilima. The concentration to three villages, and not more, have been due to time constraints and practical reasons of not being able to travel far each day. Hence, the study is concentrated, but still allows for some geographical spread.

During the process of interviews we have also found what characteristics we have missed out, and have been able to direct ourselves to other people in the later interviews, to fit special criterias. Gender, age or the households relative richness are those criterias. The fact of being or not being a *model farmer* has also been an issue. When mentioning age, most farmers have been in their fourties or fifties which is representative for farmers in this area. One informant has contrasted to the others by his low age, and this was because of our search for a younger person's perpective and contribution.

Additionally, two DAs have been interviewed, in two villages respectively, to get their view from their position in the project. As DAs they work close to many farmers and have the opportunity to see impacts on a larger scale, which makes it interesting to hear their views. Also the two ISD staff that work more or less daily with this project in the Dessie branch office have been interviewed to check and reflect findings from the field and be able to ask project-specific questions important for our own overall understanding.

The study area and the informants will be further presented in chapter four.

2.4 Interpretation

Neither I nor Josefin know the language that is spoken in South Wollo, namely Amharic. There was therefore a need for an interpreter. Working with an interpreter is a key for being able to communicate with the informants. Meanwhile, it is also a challenge to ensure that answers really are translated in the way the informants express themselves. When farmers' own stories are important, as well as *how* they tell them, I have really experienced that the interpretation is an obstacle between me and the informant, since everything that is communicated is filtered or delayed. This is a problem that has to be dealt with. We have tried to erase these obstacles by discussing these issues with the interpreter and making clear what we are interested in knowing from the informants in order to make translation of questions and answers as accurate and easy-communicated as possible. Conducting a study where the understanding of *how* people express themselves is even more central, this obstacle between the researcher and the informants will force oneself to either learn the language or change type of study. We have never found ourselves in this situation though, as our results have been sufficient despite the interpretation obstacle. Additionally, three interviews with the DAs have been conducted in English as they know English well.

2.5 A Field Study

Although interviews have been the major formal source of information for this study, the field study that these interviews have been a part of is probably equally essential for the eventual findings. To come from a completely other context and all-day life and then dive into to a brand new context for a limited period, gives other possibilities of taking perspectives on problems and events. This type of study entails a constant asking of questions, a constant curiousness to understand as much as possible about the case during a limited period of time. For being able to understand what the informants actually say, this part of discovering their context is crucial. Even though it is the informants' sayings that I analyse in this text, there are all these other questions I have asked to the interpreter, to bus drivers and to random people I have come across. They all have contributed with building my understanding necessary to go further drawing conclusions. They are unfairly invisible in this mass of text, and so are the events I experienced or observed that also have their contributions.

2.6 A Case Study

Going deep into an issue exploring its context has its advantages of getting a profound understanding that wouldn't be possible otherwise. A disadvantage is however that it can be hard to apply on other issues. As Otto (2013:113-114) puts it, a case study discovers a phenomenon in its real-life context, where the context is both the key to the understanding and often the obstacle towards generalising. Having the approach towards case studies, such as "What can be learnt from it?", the case study is both beheld for its closeness to its context, but also for the opportunity to actually learn something from it, although the context always has to be regarded (cf. Kvale and Brinkmann, 2009:310-315). This study should be seen as a small such case study, with the question of what can be learnt from it in the back of your mind.

2.7 Analysis

The results from the field study have been regularly summarized in notes, putting words on impressions and new knowledge obtained during the days. The recorded interviews have been transcribed and then gone through in order to see patterns as well as aspects that stand out from the others. Parallel to the field study, and before arriving to Ethiopia, I have been reading articles and earlier research within the themes of PPT, Ethiopia, Ethiopian agriculture, livelihood and food security. This reading has been a basis of understanding, from which I have been able to conceive more from the findings of my own study.

I have been inspired by the grounded theory approach on how to do research, due to its humbleness towards the research challenge. Grounded theory takes into account that knowledge is socially constructed, hence the need to build my own knowledge about the case (cf. Hajdu 2006:35-36; Otto 2013:116). The objective is not to go into the field with already set hypothesises, notions and theories, and try to connect the material to them. Rather, the researcher goes into the field and collects data, to then link it to suitable notions and theories that can help understand the phenomenon. The hypothesis can be formulated and reformulated during the research; the interlinkages between the material and the analysis are ever-changing. Advocates for grounded theory stress that this method has advantages when it comes to enabling more solid and well established conclusions (cf. ibid.).

I have used this perspective to try to be open to the material I faced, and not be afraid to pass notions for new ones that may show useful. The initial outset has been socio-economic

impacts of PPT in some way, but as this can have broad meanings I tried to find suitable ways to narrow down my approach. It was during a walk in Dessie town, when I and Josefin waited for an answer from one of our informants if we could come and visit him or not, that we together discussed what a livelihood perspective is about. We discussed what Flora Hajdu, a researcher at our university department, came up with in her doctoral thesis about livelihoods in Eastern Cape, South Africa. This was when I got the idea of using a livelihood perspective as a framework for my thesis. Then, halfway done with the interviews, I could see how this approach could tie to the stories of the farmers. I kept to this approach, with some additional concepts used to complement, throughout the study.

3 Theoretical Framework

3.1 The Context of the Global South

First of all, this is not a study that falls within the category of those primarily aimed to study a phenomenon related to the so called 'developing countries'. The theoretical framework and context that this thesis is written within, is in several ways though similar to other research with this overall bracket. However, I myself have not worked with this bracket for my eyes. Since I think this can both affect me as a researcher, what I find and in which way I look at things, I am in the same way convinced that this can also affect the reader. My stand is that there are no 'developed' or 'developing' countries, and that this two-part divide of the world's countries is of more harm than use. All countries are developing, and this approach makes those models of development that see all countries at different levels of a staircase, all heading for the same destination, pointless(see post-development debate, e.g. Esteva, 2010:1ff). It is neither possible, nor desirable, that all countries end up being the same. Making developing countries copy the developed, that this picture brings about, is a hard and misleading process. The possibility to create good societies, in all different aspects, is present without the need to make such divisions between countries on a developmental ladder. However, there are still reasons for making communication easier by naming countries with somewhat similar characters in a group. My intention is that this can be done without emphasising the development level and relativity between different states. For this reason, I find the commonly used *the global South* and *the global North* as better names. These can also be misleading, but they work well enough in search for better terms. I define the terms not by stage of development, rather by similarities in history, colonial powers versus colonized states, social structures, culture, economy, and so on. Taking the same line, when expressions like these are not needed, it is better to be as specific as possible. Therefore, talking about matters concerning sub-Saharan Africa in particular, or even Ethiopia, I will use these terms instead.

3.2 A Livelihoods Perspective

The livelihood perspective is an actor-oriented approach, placing the individual, in this case the farmer, in a central position. As people's means of living is dependent on external factors, as well as on the individual's own will, ideas and choices, the livelihood perspective tries to discover all these different factors from the point of the individual (cf. Hajdu 2009:55-57). In contrast to the widely spread ideas about rural poor people as victims to overall circumstances, unable to change their situation, the livelihood perspective highlights the individual's space of action. At the same time, it does not neglect surrounding constraints that affects the livelihood in one or the other way. More to the point, it makes these external factors visible from the point of the individual. The deeper

understanding of the individual's perception of its reality also brings us closer to how these people cope with the external factors, as well as how they relate to changes (cf. ibid.).

Chambers and Conway define livelihood as:

> "The capabilities, assets (stores, resources, claims and access) and activities required for a means of living."
>
> (Chambers and Conway, 1992:7)

Thus, the livelihood perspective includes not only material resources as for example money or food. It also entails immaterial resources, which means that sources and aspects of livelihood can revolve around the perception of well-being in a broader sense.

Although the study of livelihoods puts the individual in centre of attention, his or hers perception of reality is not the only thing that counts (Hajdu 2009:57). Based only on the mere perceptions of the individuals, the study may be limited and narrow-minded. Social norms and policies can be invisible or hard to grasp for the individual herself, although they are present and apparently determine people's actions (ibid.). Hajdu (ibid.) further explains this by giving the example of the usage of school uniforms in South Africa. Here, school uniforms are tightly linked with the education system, and has been so for a very long time. However, the cost of school uniforms can be high for a household, especially as it demands monetary resources in order to obtain the uniforms. For instance, a household with many children and a livelihood that largely depends on natural resources not linked to a flow of cash into the household economy, will most probably experience a hard time in having the means to buy such uniforms. Even though sending the children to school is highly regarded, the school uniforms may be the obstacle that prevents the children from going. The inseparability between education system and the uniforms is solid, and thus it makes a school without uniforms hard to picture. Blaming the school uniforms for being the obstacle is therefore not the conclusion. The knowledge that there are several countries in the world not using school uniforms, and the fact that mandatory school uniforms is regulated by national laws that can be changed by politicians, is not apparent to the households studied (cf. ibid.).

Thus, for a more profound understanding, the context of the studied individuals and their livelihoods is important. Here, it is the researcher that contributes with putting the perceptions of livelihoods in a context, and detects what other aspects that can be important for the understanding of livelihoods. In this case, the context that surrounds the studied farmers has been discovered by me through the field study. The context of these livelihoods will be evident through the thesis, but will also be further specified around the special circumstances bound to the South Wollo zone, ISD and the Ethiopian state as actors.

3.3 The Sustainable Livelihood Framework

Sustainable development as a notion has gained popularity in recent decades, due to its effort to cover not only the economical development, but also the ecological and social aspects. Sustainable development can be defined as development that seeks to meet the needs of present people, and at the same time not compromising with future generations' ability to meet their own needs (Adams, 2009:9).

When it comes to the global development debate, the need to ensure sustainable development is equally important in countries in the global North, as in the global South. The Millennium Development Goals is one example of efforts being done in recent years. Ethiopia is included in the targeted countries for these goals, which has resulted in a large focus on poverty alleviation (UNDP Ethiopia, 2012). One common way to address poverty and work with overall development is through a livelihood perspective. The concept of the Sustainable Livelihood Framework has been adopted by NGOs and multilateral organisations working with these issues, and has thus evolved as an answer to address sustainability within livelihoods as a tool for development work (Hajdu2009:57).

The Sustainable Livelihoods Framework is explained by Baumann and Sinha (2001:1) as both a development objective, i.e. to achieve sustainable livelihoods, and as an analytical framework. The latter use of the concept is to ”provide an understanding of all different factors influencing people’s ability to enhance their livelihoods” (ibid.). The departure point is that people use their livelihood assets, which can be derived from human, natural, financial, physical, political and social capital. These are filtered through processes, such as laws, cultures, norms, – and structures, such as level of government and the private sector. The own interest and priorities of the individual are also determining factors. This results in different livelihood strategies with outcomes for the individual which can be, for instance, more income, increased well-being, reduced vulnerability, improved food security and more sustainable use of natural resources. Additionally, the vulnerability context also affects the livelihood strategies that are used. That means, different chocks and unpredicted events can change both the available capital for the individual and also change the priorities or interests of the same (Hajdu, 2009:57-58, Bewket, 2009:37-40).

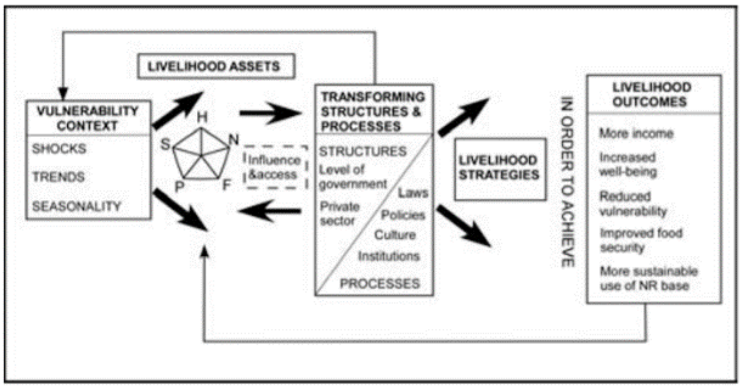

Figure 1. An illustration of the Sustainable Livelihood Framework adopted from Farrington (et al., 1999) in Hajdu (2009:58). The letter H, N, F, P and S stands for human, natural, financial, physical and social capital.

Although sustainability, in its definition and aim as a notion, tries to entail the three different aspects of development, it has often had its center around the preservative use of natural resources (Hajdu, 2009:58). However, it is when you integrate the environmental aspect into other useful or powerful concepts, notions or frameworks within the often economical and social dominated development sphere, that a greater effect on sustainability can occur(cf. Adams, 2009:19-21). Therefore, using the concept of sustainability together with the livelihood perspective will enhance and broaden the understanding of livelihoods, i.e. how people can develop their means of making a living over time, without making their resources or themselves exhausted. Scoones puts sustainable livelihood in these terms:

> ”A livelihood is sustainable when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.”
>
> (Scoones, 1998:1)

Thus, the sustainable livelihood framework is holistic in its approach, aiming to grasp the vulnerability context, the livelihood assets, the impact of structures and processes, the own interest of the individual, the different livelihood strategies that come out of this and their consequences. It also includes a time dimension in order to discover livelihoods’ durability and sustainability. The holistic outset makes the answers from, and use of, the framework, dynamic. The one who seeks simplified and generalised conclusions will most probably have to direct their attention to somewhere else.

3.4 Poverty and Vulnerability

The livelihood perspective has been criticized for not being able to address power relations to a sufficient extent (Hajdu 2009:62-63). Power relations are important for the reason that they also put constraints on accessibility of resources to the individuals. Without the perspective of power relations present, there is the possibility that livelihood analysis contribute with a description that works good in theory, but is not valid for capturing the hard reality. For instance, even if a resource is available, power relations can make it impossible for some people to access it (cf. ibid.).

To enable power relations to complement the livelihood perspective, I will, similarly to Hajdu (ibid.) use the notion of poverty to spot these issues. Here, the definition of poverty needs to be further discussed, as there are plenty of definitions and uses of the word that will not be adequate to describe power relations. For instance, the commonly used definition of poverty that is frequent in mainstream communication about development issues globally, for example by United Nations Development Programme(UNDP Ethiopia, 2012), is not suitable for this purpose. This definition simply differentiates those who are poor from those who are not, depending on whether their daily income is one dollar or less(cf. ibid). Hence, this definition of poverty does not make room for any power relation complexities and has to be disregarded for the aim of this study.

What I find as a more adequate definition of poverty for this study is the one of Sen (1983:153ff), which highlights that it is the **capabilities** to meet the needs of a person that is important, rather than income. For instance, if a person is starving, it could be a number of reasons for this. One could of course be income, or the lack of money to buy food, but it could also be absence of transportation to the market, or the lack of power over the food produced by a farmer. Building on this, poverty for the poor themselves can mean much more than a small income. Poverty can be the lack of choices, ”voice”, education, having bad health or being insecure (Hajdu 2009:62).

Tightly linked to poverty is the notion of vulnerability. Kelly and Adger explain:

> ”The capacity of individuals and social groups to respond to, that is to cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being.”
>
> (Kelly and Adger 2000:325)

The livelihood perspective, vulnerability and poverty are three notions close to each other, but which are still complementing one another. These will work together to enhance the understanding of how farmers perceive The PPT Project’s impacts.

3.5 Food Security

Food security is often described as access by all people at all times to the food required to them to live a healthy and productive life (Webb and von Braun, 1994:12). Food security is in that sense similar to the definition of livelihood security, only that food security focuses on the food as the only aspect of the livelihood as a whole (cf. Hajdu 2009:59). The notion is applicable both on an individual or household level, but also in society at a larger scale. When discussing food security for a whole village, region or even a country, Webb and von Braun (1994:12-15) break food security down into three factors needed for food security in the context of Ethiopia. Firstly, food security is about adequate food availability, which includes sufficient local production of goods and services, both farm-related and nonfarm-related, and a stable or upgraded utility of the resource base. Secondly, food security is about adequate food access, which except sufficient local production, also includes a sufficient income and access to food, as well as a stable food intake. Thirdly, Webb and von Braun recognise that the in-house distribution of food is important for the food security for everyone in the household. A good home environment, especially regarding health and sanitation is also one factor for food security. Finally, for understanding the concept of food

security there are additional five themes to which the concept can be tied up around. These are 1) resources, 2) production, 3) income, 4) consumption and 5) nutrition. To be food secure, all these aspects need to be fulfilled in a sufficient way. For example, a high monetary income, does not automatically result in an appropriate food consumption. And further on, appropriate food consumption is not valuable if it is lost in diseases or sickness due to poor sanitation, as when the human body is unable to metabolise the food consumed (cf. ibid.).

Food security is an important aspect, especially when it comes to the area of South Wollo, which is one of the famine-prone areas of Ethiopia (Webb and von Braun, 1994:20-21). The area's history of repeated famines the last decades puts extra focus on food security and how to prevent future crisis. Even though famine often has many roots with a complexity of causes, food security is still one issue of several to work with (cf. ibid:10-16). The PPT and the relevance to food security might therefore be fruitful to look deeper into. However, to study the food security aspect alone will not be too interesting without all the other aspects that are relevant to the farmer her/himself, and the context that food security is embedded within. This context is the broader livelihood perspective. Hence, I will use food security *and* livelihood approach parallel to each other, to both highlight the relevance of food security, but for that sake not hide other relevant aspects. Besides, for the farmers interviewed, the food aspect is an integrated part among others in their daily life. Trying to separate this is not in line with the farmers' stories of reality, and an isolation as such would thus have needed other questions and partly another methodology.

3.6 Limitations on the Theoretical Framework

Having investigated what a livelihood perspective can be about, what poverty, vulnerability and food security is, we arrive at an understanding about the complexity of these terms. To fully take advantage on these notions, I would need much more, and detailed, data. For example, to entirely investigate how farmers' livelihoods have changed from the using of PPT I would need a much larger study, complemented with other sorts of material. Therefore, the aim of this study will not be to use the complete depth of these notions, rather it will be able to scratch on the top of the issues. Nevertheless, I still find that the livelihood perspective, and the closely related aspects around it, is an interesting approach that will enable me to discover some of the socio-economic impacts that the farmers have perceived.

4 Study Context

4.1 The Surroundings

The area where this study is conducted is within the South Wollo Zone. Since 1996, Ethiopia is a federal state consistent of eleven regions, which are partly ruling themselves under the federal government of Ethiopia as a whole (Briggs, 2012). South Wollo Zone lies within Amhara region, which is in the more densely populated areas of the country (WFP:10).Within each zone, there are sub-parts, *woredas*, which are often translated to districts. Each *woreda* consists of *kebeles*, which are the smallest state administrative unit. Many villages have their own *kebele*, while larger towns or cities consist of many *kebeles* together (cf. Briggs, 2012).The farmers we have interviewed live in three different villages and in three different *kebeles*, namely Gobeya, Pasomille and Tessabilima. Gobeya and Pasomille belong to the Tehuledere *woreda*, while Tessabilima belongs to Ambasell *woreda*.

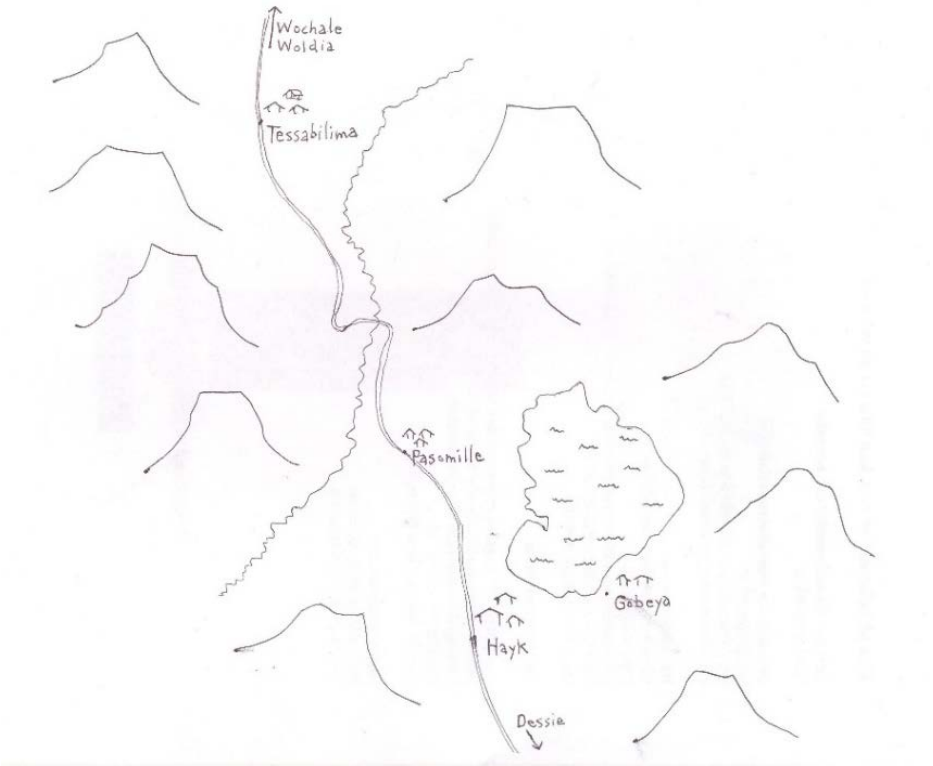

Figure 2. Map over the research area. Based roughly on Google Earth maps. Illustration: Salomon Abresparr, 2015.

Unfortunately, South Wollo is famous for its history of drought and famine, the main ones in recent time occurring 1983-1985 and 1993-1994 (Webb and von Braun, 1994:20-21, Bewket, 2009:18-19). Although there are efforts to shake off this reputation from the area's shoulders, aid organisations are still present in the area, with their offices making a significant impact in the street view of Dessie, the zonal capital.

The South Wollo Zone is dominated by mountains, as it lies in the Central Highlands of Ethiopia, the mountains stretching almost from Addis Ababa in the south to the Eritrean border in the north. To the east of South Wollo, the mountains descend into the lowland area of the Great Rift Valley, which is the valley that divide Africa all the way from Mozambique in the south to Djibouti in the north (cf. Briggs, 2012). The high mountains (with Dessie at 2600 meters above sea level) bring temperature down. They also make temperature vary between day and night, and make rain appear in two seasons during the year. The landscape is dominated by mountains and hills, and the slopes and valleys are crammed with small fields, often in terraces. The landscape is rather green, even in the dry period, since the abundance of trees is quite high. There are forests, both naturally grown and eucalyptus woods that have been planted and spread here and there in the landscape. Some rivers find there ways down in the valleys, and there is also one lake within the study area, lake Hayk. Hayk means "lake" in Amharic and it is a sweet water crater lake.

South Wollo is part of the so called sorghum belt, which has got its name for the high importance the crop has gotin this area. Apart from sorghum, important grains are maize and *teff*. Fruits and vegetables are also important crops. Agriculture is dominated by smallholder farmers, with a majority having access to farming land smaller than one hectare, sometimes up to two hectares (Bewket, 2009:22). Most households do mixed-farming, which means that they apart from cropping also keep animals like cattle, sheep, goats, dromedaries, hens and donkeys. Special for Hayk and its vicinities is the high production and market hub for *chat*.

Dessie is the zonal capital with estimated 160 000 inhabitants, but it probably is home for a much larger population(Briggs, 2012). From Dessie, the winding asphalt road clings along the hillsides towards Woldia, the zonal capital of North Wollo. Along this road lie all the three villages where our informants live. The distance between Dessie and Hayk is approximately 25 km, and from Hayk it is 5 km to Gobeya, 6 km to Pasomille and 20 km to Tessabilima.

4.2 The Push-Pull Technology

The 'push' and the 'pull' refer to growing different plants that on the one hand repel the pests, and on the other hand attract them away from the crops. In detail, two major cereals, maize and sorghum, are largely affected by both a stem borer moth and the parasitic weed *Striga*. The solution that the Push-Pull Technology (PPT) advocates is to plant the legume *Desmodium* between the rows of maize and sorghum. The *Desmodium* plant releases substances that make the female stemborer moths fly away. At the same time, planting a special *Brachiaria* grass outside the field attracts the female moth to lay her eggs in the grass. Moreover, the *Brachiaria* grass is equipped with hairs that make the moths get caught and die. Back to the *Desmodium*, the roots of the plant releases chemicals that cause the *Striga* seeds to germinate. By doing so, they die in the soil before they can attach themselves to the roots of the maize or sorghum crop (ICIPE, 2007:3-5).

Figure 3. The parasitic Striga weed attacks the roots of the maize plant.

Figure 4. The adult stemborer moth.

Figure 5. The Desmodium plant.

Figure 6. The Push-Pull field. Desmodium (push) is planted between the rows and the Bracchiara (pull) on the sides.

Illustrations:
Salomon Abresparr, 2015.

4.3 The informants

Here comes a short description of the informants, in order to get to know them a bit before entering the main part of the study, where I will tell their stories and quote them. Their ages are all rounded off and their names are changed.

Almaz is in her forties and lives right beside the road in Pasomille with her three children. She divorced from her husband seven years ago and has run the farm alone since then. She is a *model farmer* and was the first one to try PPT in South Wollo.

Ibrahim is in his sixties and lives further away from the road in Pasomille. He lives with his wife. He is not a *model farmer* and have tried out PPT for two years.

Eyob is in his fifties and he lives in a house beside the road in Tessabilima with his wife and the younger of his eight children. Eyob has used PPT for three years and is a *model farmer*. He also works in the *kebele* administration and some of his sons run a door manufacturing business by his house.

Binyam is in his forties and lives with his wife and four children at a farm along the road in Tessabilima. He has been a farmer since 1995, after finished his work as a soldier. He has used PPT for three years, is a *model farmer* and runs a reselling business besides his own farming.

Rihana is in her thirties and live with her husband and two children a bit to the east of Gobeya village. Rihana is a *model farmer* and has been practicing PPT for three years.

Mergya and **Tsegereda** are in their fifties and live some hundred meters east of the road in Pasomille. They have two children together. They are *model farmers* and have used PPT the last growing season, but failed due to drought in the early stages of the plants.

Said is in his fifties and lives with his wife and four of his seven children close to Hayk. Their farming land is on the slopes down to the lake near Gobeya. Said is not a *model farmer* and has never tried PPT.

Muhammed is 25 years old and the son of Said. He helps his parents with their farming, as long as he does not have any own land. He is part of a project for marginalised youth without access to land, who together in the cooperative got some land where they do intensive organic vegetable farming close to the lake.

Omar is a DA in Gobeya *kebele*. He is an agricultural expert and has worked for another *kebele* before he moved here. Omar advices farmers, gives trainings in the Gobeya FTC and reports back to the *woreda*. He has been taught PPT by ISD and it is now part of his work to advice farmers in this technology.

Tesfaye is a DA in Pasomille *kebele*. His work and background can be similarly described as Omar's. At Pasomille FTC there is a demonstration plot for the PPT.

Adane works full time for ISD and runs the Dessie branch office. He coordinates all the projects that ISD conducts in this area, including the PPT Project.

Mogez works half time for ISD in Dessie and share work duties with Adane.

5 PPT is More Than Higher Yields

5.1 The Multifunctionality of PPT

The main objective of PPT is to reduce losses of maize and sorghum production due to attacks of stemborer moth and *Striga* weed. The yield increase is essential and the main reason why the technology has been developed. This is also reflected in my informants' answers, as will be discussed later on. However, there are a lot of other aspects that the farmers also stress, which are mentioned almost as often as the yield increase.

The positive effect for the animals is observed by each and every one of the farmers. As everyone is keeping animals, and that availability of forage may be scarce or fluctuating over the year, the extra forage that can be provided is precious. What is important here is that the grass is not cut-down or grazed during the period when the sorghum and maize plants are growing, since the grass and its hairs need to be there in order to catch the stemborers and their eggs. Binyam and his fellow farmers in Tessabilima have solved this through planting their PPT-fields close to each other and then engage a guarding service from the *kebele* which will make sure that animals are kept away from the PPT-fields during the critical period. The service is paid by tax to the *kebele*, and although this should be a service possible in other *kebeles* too, this free grazing in inappropriate times is regarded as a challenge among the other farmers.

What is also stressed by several informants is that the *Desmodium* fixes nitrogen, and thus enriches the soil. To get this bonus effect of the plants that are anyway sown for other purposes, is turned even more valuable when put in contrast to the other often work-intensive actions that otherwise need to be undertaken in order to maintain soil fertility. Also the *Bracchiera* has shown to have positive effects on the soil quality, as the grass' root system is relatively well-evolved. Some farmers have planted one row of Bracchiera in the space between the different fields. Especially for fields in a slope, this means that the root system of the grass works as a soil erosion preventive measure.

Rihana, then Eyob, tell about another important advantage of the PPT:

> "I don't use chemicals because they are dangerous and expensive. But the PPT is free and I will not turn my back to the method."
>
> (interview with Rihana, 2015-04-09)

> "The chemicals are very dangerous both for us and for our animals. It is also harmful to the soil, and the microbes that live in the soil."
>
> (interview with Eyob, 2015-04-08)

When talking to the agricultural experts, they further explain the background behind this common opinion of farmers. They say that, earlier, pesticides have been introduced rapidly in order to get rid of pest problems, but without too much control or measures undertaken to prevent inappropriate use of the chemicals. Consequently, serious accidents among the farmers have occurred and fed scepticism towards chemicals. Nowadays, education about appropriate pesticides use is taking place in the FTCs, and new recommendations are based

on other ways of reducing pests in the first stage, with pesticides mostly recommended as a last resort. This is also where the PPT comes into the picture as a preventive technology. Mergya explains:

> "It (the PPT) is very useful because it is a primary prevention. We use Integrated Pest Management or the local cultural or traditional ones (technologies) after the insects have attacked the crops. We spray that one when we see the symptoms. But the PPT is used before the insects have made any damage to the crops."
>
> (interview with Mergya and Tsegereda, 2015-04-14)

To prevent possible harm already from the beginning can be the most effective way of reducing costs, as measures done when the pest is already there is often more costly in time, effort and money, and cannot compensate for the irreparable harm already done to the crops. This is only true when the investments of setting the preventive technology in place is less costly. In this case PPT is a rather cheap method, as Rihana argues. But, that it is for free is not fully true, as getting the seeds or the plants is an investment. Since the seeds or seedlings are provided by ISD, this is not an issue, and will continue so as long as the farmers get this support. Compared to the pesticide prices that have risen, the low level of input that the PPT requires can be an advantage that makes more and more farmers take the step and adopt the technology.

Related to this, one disadvantage of the technology is that growing *Desmodium* and *Bracchiera* takes space, space that can be a very limited resource for many farmers. The major concern I have heard that farmers stress, is the lack of land to set aside for the PPT-plants. Even if this problem is mentioned by all the farmers we have talked to, the problem gets more serious for the farmers that have even less land. Sometimes, this space problem is alleviated by planting only one row of *Bracchiera*. The results to some of the farmers have still been good by this, but studies on the effectiveness of planting less *Brachiera* needs to be conducted to be sure. This is one example of how the technology can be further developed to suit the needs of the farmers.

Another disadvantage of the technology is that it is not fully adapted to the farmers' common method of using crop rotation. That means, a field planted with *Desmodium* and *Bracchiera* for growing maize or sorghum can the next time be used for *teff*, for instance. During this next growing season there is apparently no need for *Desmodium* and *Bracchiera*, which makes the farmer take away the plants to release space. The next time the farmer wants to grow maize or sorghum *Bracchiera* and *Desmodium* will once again need to be provided.

Despite some challenges that need to be addressed and worked with, there are still many positive effects of the PPT beside the main objective. This multifunctionality of the method has been highly regarded by the farmers, and this is something that made strong impression on me. I have a hard time picturing the success of the method, if it wasn't for the multiple benefits of the technology that make it more powerful. The multiple uses of PPT fit well into the livelihoods of farmers, as their livelihoods are not dependant on only the stemborer, rather on many different delimiting and enabling factors. Its contribution to animal forage is crucial. Because for these people, animals can be as important to their livelihoods as sufficient yields of sorghum. Keeping soil fertility and reducing use of expensive and harmful chemicals are also aspects that fit well in the reality of the farmers. To find these points where different benefits join together, and take advantage on them, is maybe the difference between a successful and a failing technology. Thus, to understand the whole context where the farmer acts is crucial to make farmers easily adopt the technology. A prerequisite for success is to adapt the technology to the livelihood strategies of farmers. In contrast, developing a technology that addresses only one single problem, without considering surrounding aspects, brings the risk of not coping well with the rest of the livelihoods of the farmers. Other overall aspects of how the PPT has been developed to fit into the livelihoods of farmers will be further discussed in the next session.

5.2 PPT's Adaptation to Farmers' Livelihoods

To explore how PPT is developed to fit into farmers' livelihoods, let us start listening to Adane, one of the ISD workers in Dessie. Adane explains how the sorghum and maize plants are infested by the stemborer moth:

> "You see, usually the long varieties of sorghum, you see, they are loved by the farmers because they use the stem for construction of houses. That's one. The second is they want it for fuel. The third one they want it for animal feed. So because of these reasons, the farmers didn't want to burn the stems. So as soon as they harvest they leave the stems in the fields, have you seen? (He is asking if we have seen the heaps of sorghum stems that are spread out everywhere in the valleys of South Wollo. We nod.) So the life cycle of stemborer is that, it will take a diapaus, do you know the pupa? The pupa remains in the stems, in diapaus stage, then no active, unless it gets rains. Then, since the pupa is already in the stem, in diapaus stage, as soon as the rain shower period begins, the butterfly hatch out from the pupa. Then it goes from the pupa, within three or four days, it begins to lay eggs. That time coincides with the maize and sorghum seedlings, because as soon as the rain comes, the farmers begin to sow maize and sorghum in the fields. That means, today is the rain, tomorrow the farmers plant and sow, that means after ten days they have maize and sorghum seedlings growing. On the other side, the butterfly hatch out from the pupa, she searches, she gets sorghum and maize, that's where she lays the eggs, that's how they are infested.
>
> (interview with Adane, 2015-04-16)

One major reason why the stemborer moth is such a big problem, is because the stems of sorghum are kept and stored by the farmers. If they would destroy the stems directly instead, they would reduce the numbers of stemborer moth, since the pupas of stemborer moths dwell in the stems. But if the farmers would burn the stems, they would lose the additional values of the sorghum that they so highly appreciate. The actual sorghum yield is one desirable outcome of the farming, the ability to use the stems for construction, fuel and forage are three others.

I ask Adane if there is any other way to get rid of the stemborer, and there is. You could simply, after harvest, leave the stems spread on the ground and the stemborer moths die, since they cannot resist the sun. This was one solution that the agricultural experts had suggested to the farmers, but the farmers did not agree that it was a good solution, because the free grazing animals will eat the stems at once if they are spread out and the forage will then not be stored for future consumption. Another solution is to collect the stems and bring them to the house, since the adult stemborer moth will not be able to fly more than 50 meters during its lifetime, and will therefore not be able to infect the plants in the fields to the same extent. But here arrives another problem. By the house, the stems are likely to become either forage to the animals immediately, or they are used as easily accessible fuel material. Then, the benefits of keeping the stems are lost, which makes the farmers still want to keep the stems in heaps spread out in the fields.

Although there are other measures to reduce the stemborer, the development of the PPT shows that the way the farmers value the multiple uses of sorghum and maize is recognised by the agricultural experts. The PPT enables the farmers to continue their growing of maize and sorghum in the way they want, receiving all the different benefits from the plants. A common problem with agricultural experts' solutions is that they are designed to solve one specific issue, but do not take into account other important values or issues relevant to the ones that will actually make use of the solutions, which is also a common critique within agro-ecology(cf. Agro-Ecological Innovation, 2012:1-2).Adane is aware of this though, expressing that agricultural experts have their own way to see things, but farmers may have other perceptions or priorities. It is important that these different perceptions meet, to create successful solutions to problems. PPT is an example where this have been done to a large

extent, taking into account what values the farmers put in different aspects of the production and adapting it to fit into their livelihood activities.

5.3 Among Many Other Projects

During our field study we have come in contact with many other agricultural projects, methods and campaigns set out by ISD, by the Ministry of Agriculture or by other NGOs. The irrigation systems have shown to be of great importance to many farmers in this area. Other technologies we have come across are the planting with space, planting in rows, different methods for composting, agroforestry, integrated pest management, promotion of short growing varieties and improved yield varieties, the use of soil erosion preventive *gabbeons* and so on. During the interviews, I have understood that for some of the farmers the distinction between all these methods and projects is not that clear. The distinction between them is anyway not that important to the farmer, as it does not really matter where they come from; the importance is what the farmer receives from them. The farmer can learn and pick the methods she or he likes, and then use and mix them to the extent she or he wants. It is in this context the PPT has to be seen, it is one technology of many affecting the livelihood of farmers. Even though I have tried, and to some extent also succeeded, to separate PPT from other technologies when interviewing the farmers and then analysing their answers, it is clear that this separation is neither easy, nor the most desired to make. This is due to the approach that it is the farmers' perception of the reality that is important in this study, and if PPT is just one technology of several important to the farmers, then PPT has to be valued in that context.

6 PPT and the Sustainable Livelihood Framework

6.1 Higher Yields of Maize and Sorghum

> ”Before implementing the technology I harvested three *quintals* at a plot with the size of 30x60 meters. The first year using the PPT I could harvest 4,5*quintals*, the second year I could harvest five *quintals* and the third year five *quintals*.”

(interview with Eyob, 2015-04-08)

Eyob describes the improved yields after he started using the PPT, showing a 60-70 percent increase in his sorghum fields. Among the farmers we have interviewed, Eyob is the one which in the most positive way tells about the increase in yields that the PPT has brought. Other farmers, like Almaz, talks about a 50 percent increase and others do not know exact numbers of their yields, but talk about their yields as ‘good’. Ibrahim says that his yields have been good, but it is hard to tell if the PPT has helped, and if so, to what extent, since his neighbours who have not implemented the technology also have got good yields recently. Mergya and Tsegereda believe that the technology will result in better yields, but have up to this point failed due to drought in the early stages of the plant growth.

Although most of farmers interviewed have a positive experience about the yield levels after adopting the Push Pull Technology, better investigations of actual yield sizes need to be consulted to get a more extensive picture. The yield data collected within the project 2014 often shows estimations of 50 percent yield increase, with some farmers receiving up to 90 percent(ISD, 2015).

Higher production is important in order to raise food availability. In first case for the farmer her/himself in terms of more food available for home consumption or for selling to get money in order to pay for other household needs. In second case for the surrounding society, as a surplus of food produced in a household can be sold on the market, making larger quantities of food available on a higher level. All the farmers we have interviewed have talked about this relationship between higher yields, home consumption and the market. A majority of the farmers express themselves similar to how Binyam does when I ask if he sells the crops or if they are for home consumption:

> ”...it depends, varies from time to time, from production season to production season. Because when we produce a lot we take to the market, if it is less it is for home consumption.”

(interview with Binyam, 2015-04-08)

Even if surplus is often sold on the market, our interviews have also shown a variation in how the household handle home consumption in relationship to market selling, and the importance of this selling. Next paragraph will discuss this further.

6.2 Selling to Meet Needs

The Push Pull Technology focuses on maize and sorghum, two crops which are important as staple food in the homes. However, they are less important elsewhere, which results in a declining interest of selling these to the market (cf WFP:30). Of course, sorghum and maize are not excluded from the market, but they are of minor importance compared to non-grain produce and other grains, like for example *teff*. As *teff* is the basic ingredient of *injera*, the national dish served everywhere, in homes as well as in restaurants, the interest of selling and buying *teff* rises (cf. ibid.). In comparison, sorghum is hardly ever seen in most restaurants. During my field study, I saw sorghum only once in a market, compared to other products which are always present. Nevertheless, as the above quote by Binyam shows, there is a market for his maize and sorghum.

What the other farmers have shown is a much greater interest of selling other products to the market than their increased yields of maize and sorghum. Almaz, for instance, expresses that she never sells her crops to the market. The increased crop yields are thus consumed within her home, and consequently, the abundance of food and the safety margins have become larger. She sells vegetables and fruits to the market instead, and this income in terms of cash is enough to cover all her other expenses.

Rihana sells mostly vegetables, milk and sometimes sorghum to the market, and she estimates that three quarters of the total production is for home consumption, leaving one quarter to the market. Both Mergya and Tsegereda, and Ibrahim, mostly produce for their respective homes. For the much smaller part of selling, Ibrahim mentions his vegetables. Mergya and Tsegereda grow very little vegetables, since they do not have access to suitable land. In order to get vegetables, and among them the most wanted *berbere*, they sometimes sell some of their animals for money.

As it seems, the higher yields of maize and sorghum due to the PPT Project, has both been subject for increased food supply for home consumption, and for selling. However, the importance of being able to sell to the market is clearly visible in Eyob's story:

> Salomon: "So what did you do with the increased harvest?"
>
> "My children are students and there are always school expenses etc that have to be covered. So the most of the harvest I sell at the market. /:/ Two of my children are at the university, one is at Axum University and the other at Haromia University. As students they have many needs and in order to meet this the greater part of the harvest is sold at the market."
>
> (interview with Eyob, 2015-04-08)

How Eyob talk about the use of his crop produce is more market oriented, compared to the other farmers we have interviewed. The different approaches of the households of what to do with the increased yields are dependent partly on what other resources that are available for the individual household, and also what personal interest that lies within each individual. I will discuss this later on.

Going back to the importance of selling, what Eyob's quote also shows is the great attention he puts to his children's education. In order to meet this need of paying for school expenses, he tries to sell as much as possible of his produce to the market. Within this context, higher yields must have been most welcome for Eyob to enable a greater cash income. Whether the actual production from the exact fields where PPT has been applied is sold on the market or not, is maybe not the only thing of importance here. Equally essential is also the fact that being able to sell some of the farmers' own products on the market, may it be maize or tomatoes, results in a cash income that is desired by the farmers. The farmers' effort to not only produce for themselves, but also for others in order to get access to cash, shows that they are integrated in the surrounding economy, where needs of the household demand monetary payment. To be aware of this need is crucial when working with agricultural projects in order to enhance livelihoods of farmers.

6.3 The Different Livelihood Strategies of Farmers

Common for all the farmers we have interviewed is that they have applied what could be called a mixed farming system, meaning that they both involve in plant production and animal keeping. They do it to different extents and with emphasis on different things, but the outset for them all is the same. As they are partly subsistence farmers they need a bit of everything in order to produce different foods. Even if some of them probably could have a sufficient production of only plants, and buy animal products from the surplus, the need of having animals to help with ploughing, transport and for recycling nutrients to the soil makes them indispensable. As in many other cases, social norms of what you should eat, or the food culture, also determines what the farmers produce, and certainly also values about what a farmer should grow, or involve in, to be a good farmer. Such values of norms and culture are not deeper investigated in this study, although we have faced traces of these during our field work. For example, the high importance of *berbere* that everyone were growing showed to be extra important, as it came up as a great shortcoming that Mergya and Tsegereda didn't have the resources to grow *berbere.* Also, the pride and eager in which Binyam offered me a glass of his own cow's *ergo*, three days before it was actually allowed to eat animal products according to the Ethiopian Orthodox Christian tradition of fasting, reveal these norms.

The only farmer we interviewed that did not involve in animal keeping in his own business was Muhammed, who focused on intensive organic vegetable production. However, the fact that he still is dependent on his mixed-farming parents and gets part of his food and means of livelihood from them, makes me not to regard him as separate from the others in this aspect.

The farmer that distinguish himself the most from the others in his livelihood activities, is Binyam, who runs a marketing activity from his farm. He produces grain, which he sells, and apart from that he also buys grain from others and resells. The location of the farm, right beside the road in Tessabilima, is one reason why this activity is so well suited for him, he says. Binyam wishes to extend his activities, especially the market activity and his own production for selling, but he faces the problem of labour shortage within his farm in order to do so.

To produce vegetables and fruits continuously, there is in this area a need for irrigation for the vegetables to grow, as there are long periods of the year without any rain. Five farmers out of nine are having access to land which is irrigated through irrigation systems. Two of the households which do not have an irrigation system to rely upon are living close to the Hayk Lake, and are therefore producing vegetables and fruits by irrigating their land with lake water. Only one household, the one of Mergya and Tsegereda, does not do any vegetable production, due to its lack of irrigated land. This shows the significant role that irrigated land plays for many of these farmers.

Two of the interviewed farmers are growing chat, which is the most recognised cash crop in this area. Cash crops, which differ from other crops in the way that they are primarily grown for the purpose of direct selling, can be a way for farmers to earn larger amounts of cash. Especially Hayk is an important hub for chat marketing. From here, chat is produced, sold and bought by resellers for transport to other parts of Ethiopia as well as for export. The town centre is fairly dominated by chat, and the road between Dessie and Woldia is at several places lined with chat stands, where vehicles easily stop by to bargain and buy from the great abundance of sellers, and then drive towards different destinations with their chat loads. Thus, for a farmer in the area around Hayk, with cheap transports directly to the chat market in Hayk and no need for additional middlemen, chat production can be a lucrative business. It is therefore maybe not a coincidence that both two farmers involved in chat growing are living in Gobeya, the village in the near vicinity to Hayk town.

People living in areas where there are also some parts of land that are forested, are likely to have access to a plot of forest, according toAdane. The areas where our interviews are conducted are relatively rich in forest, and forest holdings are therefore common. Although

I have got the impression that the forest plots are of varying quality, most of them are at least able to supply firewood, some construction material and additional animal fodder. The forest plots which are dominated by eucalyptus have the advantage that they are fast growing, which enables tree felling for timber. The disadvantage of eucalyptus is however that there is no grass growing underneath, making forest plots of this kind unsuited for animal keeping. Mergya and Tsegereda, who possess a forest plot with natural forest, say that they get no noticeable extra value from timber products, but highlight instead their forest plot's contribution to their animals' forage. For them, who have no access to irrigation land, the possibility to keep enough animals for themselves, and be able to sell an animal now and then in order to be able to buy vegetables, the contribution of the forest plot is extra valuable for their livelihoods.

Something that differed from my expectations is the fact that almost all of the farmers interviewed have their income solely from their agriculture. As earlier mentioned, Binyam has a part-time reselling business, but apart from that no one talks about their incomes or means of living from other sources than their farming or forest activities. Eyob lets some of his sons use a space next to his house to run a door manufacture. The profit from the manufacture is separated from the household's economy and does not come into Eyob's pockets, but into his sons'. However, since they are still sharing household and Eyob is supporting his sons, the door manufacture is actually easing the burden to support his sons, as they in the meantime have an income from somewhere else. Even if Eyob has his own direct source of livelihood out of agriculture, the side business by his sons is indirectly supporting the household at large.

There has been a lot of research done in sub-Saharan Africa showing that rural people's livelihoods are, to a surprising extent, derived from a multiplicity of sources, in this case from several more sources than just agriculture alone, and that the role of agriculture has been inadequately magnified in many cases (Hajdu,2009:61-62). Hajdu does however criticise this finding out of her own field experience from South Africa and claims that drawing conclusions for the whole of sub-Saharan Africa may be risky. I was anyway surprised by my own findings from South Wollo. One explanation to this, however a bit unlikely to me, is that it, when it comes to incomes, can be hard to get fully honest answers from informants. Hiding incomes or underestimating them has sometimes been a case in other studies focusing on livelihoods (cf. Hajdu 2009). Since my intuition tells me different, another possible reason can be that even if agriculture is the farmers' major livelihood activity, other much smaller incomes may be neglected by the farmers in their answers. This can have happened for the reason that they have not seen the value in talking about these minor incomes, and thus I have failed to explain the importance of describing their livelihoods fully, even including the smallest contributions.

Assuming that my informants have answered honestly and without missing details in their stories, the contribution of agriculture to their livelihoods is large. As Ethiopia's economy is highly dependent on agriculture and a large part of the population (about 80 %, Briggs, 2012) is classified as farmers, this picture is maybe right. Webb and von Braun (1994:65-67) are also strengthening this idea by their reasoning about the causes of famine being the high dependency on only agriculture for the livelihoods of many people in the same area where this study is done.

It is within the context of the livelihoods of farmers that the outcomes of the Push Pull Technology Project have to be seen. Livelihoods highly dependent on agriculture give a significant relevance of the PPT, compared to livelihoods where agriculture is just a very small part. On the other hand, to further follow the above argument by Webb and von Braun, the most crucial contribution to farmers' livelihoods in these areas would be to strengthen their livelihoods by backing other possibilities of income which complement agriculture to a larger extent. In this setting, the value of the PPT declines. However, the focus of Webb and von Braun is on the prevention of famine, which is maybe not what PPT Project addresses first and foremost.

What this study of the interviewed farmers' livelihoods also shows is that the importance of the PPT Project may vary according to which different livelihood assets and strategies that the farmers use. PPT may be of one certain value for Binyam, who can use the PPT to increase grain yields, and by so increase his roadside marketing activity without the need of employing more labour. For the farmers that have access to irrigation land, more stable grain yields on non-irrigated land can increase their food security by easing the pressure of what the irrigation land has to produce to supply the household. Since all farmers are keeping animals, the value of PPT for the increased forage availability is crucial. For Mergya and Tsegereda, who are maybe more dependent on their animals since their land resources are lacking irrigation, this aspect is even more important.

Despite some differences already mentioned, the assets and livelihood strategies of the interviewed farmers are in general quite similar to each other, based on that they all share the same outset being mixed-farming agriculturalists that are both producing for their household as well as the market. The differences in their assets have a role to play, but having investigated these differences and what consequences they result in, it is time to move on to the priorities and interests of farmers that also shape livelihood strategies and their outcomes.

6.4 Priorities and Interests of Farmers

Another factor that has an impact on people's livelihood strategies is, according to the Sustainable Livelihoods Framework, the personal interests, preferences and priorities of the individual. Another factor is structures and processes of society, including, among many others; laws, culture and institutions (Hajdu 2009:57-58).

Turning back to what Eyob said about his need to cover his children's school expenses, these sayings are clearly pointing on his priorities. During the interview he mentioned his sons and daughters successfully studying at universities in distant cities, becoming nurses and technicians. His increased yields primarily go to the market in order to support his studying children. He continues:

> Josefin: ”What do you think your children will do in the future? Do you think they will stay here?”
>
> Eyob: ”It depends.. If we are rich in the future we can move into town. But if nothing happens we will continue to live as we do.”
>
> Salomon: ”If you would have more money, why would you like to move to the town?”
>
> Eyob: ”In the town it is a much better health care. For the youths there are more work opportunities.”
>
> Josefin: ”What job opportunities are there here in the village?”
>
> Eyob: ”In this area there is only farming. This (he points at the doors that are standing outside the house and that his sons are repairing) has no market.”
>
> (interview with Eyob, 2015-04-08)

Eyob's pointing at the door manufacture, and the firm way in which he says it, reveals a sense that the future lies in the city, not in the countryside. It is showed by his concerns of his children getting higher education and preparing for a life in town, as well as for his own elder days where he sees advantages of being close to health service. He continues:

> Salomon: “What would happen to your farmland if you moved into town?”
>
> “It doesn't matter. I can rent it out to other farmers.”
>
> (interview with Eyob, 2015-04-08)

The strive for an urban life is not unique to Eyob, I have seen it in many people's stories during our field study, as well as it is reflected in the global urbanisation trend also present

in Ethiopia. Although the country has a large rural population, urbanisation has evolved quickly with cities as Dessie and Addis Ababa rapidly expanding and where construction work is being seen everywhere.

However, this is not uniform for everyone we have interviewed. A majority of the informants seem to be happy with their life as farmers and see their future in agriculture. For them, the problem is rather the lack of enough land to share with their children wanting to take over the farm. Muhammed, the 25 year old organic vegetable producer, talks dedicatedly about his work in the fields and wants to expand his production in order to reach bigger markets in Dessie and even Addis Ababa. He wants to involve more in merchantry, but will never want to fully go over to that and stop with agriculture. Ibrahim describes the future of his village, Pasomille, in nice words. The village will be flourishing and the inhabitants will together combat soil erosion, resulting in more food and more people living there. Mergya and Tsegereda are very determined to continue their work at the farm, until they retire. They are ready to let any of their children take over, if they would like.

> Josefin: ”Do you think that any of them wants to take over the farm?”
>
> Mergya: “No…” (Everyone laughs)
>
> Josefin: “What will they do instead?” (The laughing continues)
>
> Mergya: “They will sit in the town, they don't want to work at the farm.”
>
> Josefin: “And why not?”
>
> Mergya: “We don't know, they only seek for God by sitting, but they don't want to work at the farm. We are not happy in that activity…”
>
> Salomon: “So what will happen to the farm?”
>
> Mergya: “As long as I am here at this earth I will try to do what I think is best. After that, I don't know what will happen. I am advising my children and I am saying: If you want to study, you have to go to the university and study, and if you want to become a farmer you have to plow the land. But they cannot understand what we are saying, and we cannot know what will happen after us.”
>
> (interview with Mergya and Tsegereda, 2015-04-14)

Mergya and Tsegereda will manage their land carefully, but what their children will do is up to them. Nevertheless, they will be happy if their children take over, and they will act as if the children would take over one day. Said has a similar standing point, he will continue farming and manage his land as long as he can. He will support his children until the end, but what they do afterwards is up to them. However, he is very sure of that some of them want to take over the farm.

How these farmers are viewing their future is central for what priorities and interests they have in their farming, and what the outcomes of their livelihood activities will be. The involvement in PPT will follow the same aims and thus result in different changes, dependent on what they strive for. Also, overall processes such as urbanisation leave their mark on the livelihood strategies.

6.5 Driving Forces for Almaz

The story Almaz tells us is pointing to other interests and incentives for involving in PPT. We meet her at the FTC in Pasomille, where she is attending a seven days long meeting about how to improve productivity. She wants us to hurry up with the interview, in order to miss as little as possible from the meeting. Already as we are heading towards her house where we are going to have the interview, we meet two women along the road. Almaz asks the other women why they are not at the meeting and says that she wants them to go there. There are too few women present there, she explains to us when we ask what she was

saying to the women. I ask why it is important that more women attend the meeting and her answer is ”For change!”. After a series of questions we get the understanding that change is important, and that change is to not be dependent on aid anymore. When I ask what she means with aid, I get the explanation that there is natural aid, and then there is unnatural aid. Natural aid is like the trainings that the FTC or ISD conduct, like the meeting this week. Unnatural aid is when you just get bags of food or money. I interpret it as the difference between direct aid and help to self-help, where help to self-help is more okay for Almaz, at least when it aims for progress towards independency. When we leave Almaz, back at the FTC, she is relieved that she is back. The fact that she is going to attend the meeting all these days, and spending so much time at the meeting and not with her duties at the farm, is showing the importance she gives to such meetings and activities.

I see Almaz’s devotion for the work of change and the aim for independency in the context of the famines that have occurred in this area. Almaz is old enough to have experienced these hard times, and has probably been a target of, or at least seen, all the food sacks that have arrived here from both the Ethiopian state and international donor organisations. Almaz wants to be independent herself, and wishes that the direct aid to this region becomes history.

I also see her strive for change in the context of her own life story, being divorced from herhusband since seven years and running her farm alone with the responsibility of all their children. She is active in the women’s association, advocating for women’s equal rights and representing women both in the *kebele* and at other meetings elsewhere in the *woreda*. Before the arrival to Ethiopia, I had read about the hard situation divorced women are facing, since some agricultural practices are not for women to do, as it is commonly recognised as strictly for the men. Ploughing is one such thing, and when I heard that Almaz is ploughing herself, this told me that she is a strong woman fighting norms of society in the strive for being independent as a single head of household – and woman. Additionally, Almaz was the first farmer to try the PPT in this area.

For Almaz, the PPT can be a means for this change that she talks about. Testing new technologies to get higher yields and avoid troublesome pests is a strategy of trying to reach this independency. She wants to show for herself and for others that she can make it, and sustain her livelihood even better. The fact that she also shares some of her vegetable produce with her relatives, and thus also supports them on a regular basis, is adding to this picture.

6.6 Rihana’s Power Struggle and PPT

Rihana is, like Almaz, also engaged in gender equality issues. For her, the introduction of PPT has been a struggle with her husband.

> “I was really angry at that time and I told my husband that if I fail I can have the compensation from the *woreda.* But my husband still didn't agree, so I said that ‘OK, let's divide the land and I can do my thing, and you can do yours’. But at that point he changed his mind and let me try.”
>
> “From the start it was I that took the training at the FTC. When I came home and wanted to try my husband didn't agree. But I was strong and said that “I have to do it”. The DAs and the *woreda* agricultural experts helped me and I was successful with implementing the method. Now I can also use the plants used in the PPT as fodder to my animals. My husband first didn't want to try because he said that it was taking up to much space at the field. But now we are working in harmony together in the field.”
>
> (interview with Rihana, 2015-04-09)

Rihana says that she has been very involved in the women association, and that she has spent a lot of time in the *kebele* because of this. She still thinks these issues are important, and try to visit and talk to women about their rights. But, since a while she has quit her work in the *kebele*:

"Three years ago I left my position at the *kebele* as an administrator, because I realized that it is difficult to change the mindset of the society. I know, because I have already tried to change my husband..."

(interview with Rihana, 2015-04-09)

When I ask who the leader of the household is, she says with laughter that they are both heads of the household, but he is maybe to the extent of 40 percent, and she herself is about 60. All this together tells me that the PPT has played a role for her in strengthening her position in the household, always coming out as the winner in the battles with her husband. She gives an example of this:

"My philosophy is that if I see something that works for me, I'll never stop. But if I tried something out that didn't work, I stop it. The first year I had used the (Push Pull) technology, I was taken to Konso. During this workshop I explained how I had done at my field and about my experiences. Mogez and his colleagues were all surprised by the results showed at my farm. Then I was taken to this workshop in Konso, I became a *model farmer*, and I have also been awarded several times."

(interview with Rihana, 2015-04-09)

Seeing the livelihood of Rihana as independent from the rest of the household, the PPT has made her take more and more power in the household. She has now more power in relationship to her husband, and thus also more power over decisions and resources for the livelihood of the household at large, but also for the livelihood of herself. Compared to the other households, everyone except Almaz's, has consisted of a man and a woman and their children, where the man is regarded as the leader of the household. The women's power over resources and decisions related to the household is inferior to that of men's. Other livelihood strategies and interests of the woman, may therefore be less regarded in the common livelihood of the household. Rihana's success in making a power shift in the household can be explained by her strive for change and openness to try new things, in conflict with her husband's more conservative nature. Here, the *woreda* and ISD have played a crucial role in being outsiders giving Rihana right in this struggle, and further encouraging new technologies and methods. Without this outside attention, it is not hard to imagine that this power relation between the two would look different. Rihana continues:

"There are many other methods provided and taught at the *kebele*. Now my husband has agreed upon that we can use some of the farming land to test this different methods, but not all of the land."

"Before I had six month consumption, but now I can have a year consumption. Now I can construct new house and I have now two oxen instead of one. Before I had to fetch water at my own back, now I can use the donkeys instead. Now I can educate my children."

(interview with Rihana, 2015-04-09)

The use of PPT has opened up for a power shift in the relationship between Rihana and her husband, a power shift that now has consequences for the household's future farming in general. The openness to try new things to improve the farming has gained ground, and the driving force behind it is the belief in change and development that Rihana so clearly expresses.

6.7 Overall Structures' Influence on Livelihoods

The roles of structures and procedures in filtering livelihood activities, as defined in the Sustainable Livelihood Framework, I have already touched upon in earlier parts of this paper. For instance, the role of food culture and ideas of what a good farmer is, are two examples of overlying societal norms affecting livelihood strategies. Gender issues are also important, for example the norm of the man-headed household or the fact that Almaz has to

fight invisible powers to be able to plough her fields. Urbanisation is another societal process mentioned.

Going deeper into the Ethiopian state's actual role in the livelihoods of the farmers we have interviewed, there are some aspects relevant to the context of the PPT.

How land tenure issues are handled is regulated by the state through the *kebeles*. One of our informants, Eyob, works as a *kebele* administrator dealing with these issues. For instance, when someone dies, the *kebele* involves in the sharing of the land. Also agreements about, and lendings of, land between different farmers or between a farmer and the *kebele*, is Eyob dealing with. One basic precondition, regulated by law, is that the Ethiopian state owns all land in the country (Bewket, 2009:27). When speaking about farmers 'having' land, it does not mean that they actually own it. Rather, they have long leasing periods of the land, which by the length of them makes them almost equivalent to owning by the farmers themselves(cf. ibid). Although farmers talk about the land as if they owned it, the fact that they do not, and that land tenure issues in general are strictly controlled by the state, are important aspects when discussing livelihoods of farmers.

One problem that we met throughout the field study is the absence of land for the new generations growing up in the need for an income. Practically all land in the area is already occupied by someone. The farmers we have interviewed have got their land appointed to them by the former regime, but their children have not been that lucky in time and are indirectly 'waiting' for their parents to pass away in order to get access to land. The state's response to this problem, as far as I have perceived during the field study, is on the one hand to push industrialisation and enable new jobs in a growing industrial sector, and on the other hand to increase agricultural production. The aim is to pull as much produce out of the fields as possible, raising yields to feed more people (cf. Bewket, 2009:28-29). Solving the problem by taking this angle, all the different methods, technologies and trainings conducted by the *kebeles* become understandable. The Ethiopian state is through their system of the Ministry of Agriculture at national, regional and zonal level, the *woredas* and the *kebeles*, launching campaign after campaign to raise awareness among farmers on how to increase production (cf. Ayalew Abro and Alamirew Alemu, 2014:461). Besides the agricultural experts working at higher levels, each *kebele* often has three or four different agricultural experts employed, the so called DAs, who's tasks are to train and advice farmers in better farming practices. It is among these efforts by the state that PPT is coming into the picture, being a technique launched by ISD in Ethiopia, but now adopted by the government and scaled up like the other state campaigns undertaken.

Even though the state does not intervene in what people grow by laws or regulations, according to our informants, the huge interest of the state in how to raise production and change farming practises, is by all means affecting the agriculture of the farmers (cf. Bewket 2009:28-29). Recommendations of how to grow, which pesticides to use, the introduction of improved varieties and new orientations of production are some things that we have come across during the field study. The often faced new orientation of production that the state advocates is to complement the ordinary production with a larger focus on fruit trees and coffee. Even though these crops are used by the farmers themselves, they can be considered as cash crops or semi-cash crops, as a large part of the production is mainly for direct selling. The idea behind this is to raise the income for farmers, which by many aspects is welcome.Especially coffee, but also fruits to a smaller extent, are important export crops and valuable to the national economy (cf. Briggs, 2012). Hence, from the perspective of the Ethiopian state, there is an interest to increase production from these crops.

Related to this is the chat production, which is higher here than in many other parts of the country. Chat is a typical cash crop, which also has the advantages that it creates a flow of cash income to the farmer. Although chat is also a crop that is exported and has a positive impact on the economy, the state's approach is different. Due to its narcotic impacts, the state is not actively promoting the production. When I interviewed the two DAs, that in some way act as the prolonged arm of the state in the *kebeles*, I got the impression that chat

production is problematic to the state, since it has a recognised bad effect on people, but still is a cultural embedded crop with a high economic value. The exerted approach of the state is revealed when I ask Tesfaye, a DA of Pasomille, about what he would do if a farmer comes to him and seek help of what to do with his or her pest infected chat field. Tesfaye answers that he would help him or her to get rid of the pests, and that it is not his decision to make if a farmer wants to grow chat or not. It is the chewing that is disturbing, not the growing. But generally, when he gets the opportunity, he advices farmers to grow other profitable cash crops instead, like fruit trees.

Even though the state does not intervene that much in chat production issues, there are other institutions that might have an effect on the issue of growing chat or not. Chat chewing is mainly connected to people who are Muslims, while by other groups, for example among Christians, chat chewing is often not well seen. These differences can of course not be sharply drawn between peoples and between religious affiliation, as it often not so clear cut in Ethiopia, and there are many people in between having various approaches to chat. Nevertheless, the interviewed farmers that grow chat within our study are both Muslims. With this size of study, this is of course not a proper place to make general conclusions, but it can work as a *showing* example of how these other institutions and norms *may* regulate which livelihood activities that are undertaken by some people, but by some not.

While discussing cash crops, whether it is chat or coffee or fruit trees do not matter, the increased focus on cash crops in relation to food crops is problematic. Although cash crops apparently have advantages, as earlier mentioned, there are also disadvantages. Following a lot of research done about cash crops (see for example Tuffa, 2009, Bachmann et al., 2009:19ff), it is firstly a risky business for farmers as these crops are often traded at an international level, which makes prices follow international prices. Since the world market is highly volatile, farmers who do not possess large economical margins, may profit a lot when prices are high, but are easily hurt when prices crash (cf. Voituriez, 2011:202). Rihana gives an example of this as the chat production of the year before last year resulted in earnings of 11 000 ETB, compared to last year's earnings of 7 000 ETB. This equals an almost 40 percent income loss from the same field, which Rihana means is a result of lower chat prices.

Secondly, when farmers see the benefits of quickly earning a lot of cash by growing cash crops, together with the support by the state of focusing more on these crops, there is a possibility that the transition to cash crops turns out to be over dimensioned. The threat is that more and more land is used to cash crops, leaving less land to grow food crops. Food crops often have the capacity to provide cheap and nutritious food, which is important for the livelihood of many households, as well as for food security (cf. Wise, 2010:1-2, Bachmann et al., 2009:19ff). To put it simply, coffee or oranges alone, cannot provide sufficient and nutritious food for a household, compared to what *teff* or maize can do to a larger extent. These foods can of course be bought by the money earned from the cash crops, but buying all the food that is needed for a household often tend to be more expensive compared to producing them yourself(cf. Wise, 2010:1-2).

The relationship between food crops and cash crops is also crucial at a regional level, as higher concentrations of cash crop farming can replace areas earlier used for food crops (cf. Tuffa, 2009). At a higher level, this means that a loss of food crops produced results in higher prices for those foods. This is due to that the demand for food is always there, but the supply has declined. The possibility of transportation and integrated markets can solve the problem partly in theory, but the reality is more complex, resulting in higher prices or even lack of food in critical situations (Webb and von Braun, 1994:47ff). Based on the arguments by Webb and von Braun, and my own impressions from talking to people during my field study, it is essential for the food security of the region to keep food crop production high. Cash crops have advantages and are also contributing to livelihood security, as shown by our informants. Research on cash crops' contribution to food security in Ethiopia have shown varying results, depending on which crops that are grown, how

compatible the cash crops are with other crops, and most crucial, to which extent the cash crops replace areas of former food crop production (Tuffa, 2009, Negash and Swinnen, 2013:4ff). Hence, a balance between the two is preferred. What is also preferred, is a consciousness about this, both on a household level and on a policy level, since what is promoted by the state's powerful organisation reaching out to each and every *kebele*, has a remarkable impact.

According to Adane, farmers in South Wollo have more and more turned over to other crops than maize and sorghum in recent years, because of the pest problems that strike them. There are even people that are on the fringe of completely stopping to grow maize and sorghum. Simultaneously, the price for pesticides has risen, eliminating possibilities of those kinds of solutions to save yields. For food security, stopping with maize and sorghum would most likely be a negative development. Certainly, other food crops rather than growing cash crops can be the solution to replace maize and sorghum. But, as different areas have their different crops, and as maize and sorghum have been of high importance in South Wollo and is well-suited for the conditions here, it would be a loss to not be able to grow them to the same extent anymore. In this context, the introduction of the PPT is very valuable to make it easier for farmers to continue the farming of these crops and raise yields. In other words, PPT makes it more profitable to grow maize and sorghum which increases the incentives to grow them. It can thus contribute to the food security in the area as a whole and further encourage food crop agriculture in relation to cash crop agriculture, as it again brings hope on how to tackle these pests without expensive inputs.

6.8 To Gain Recognition and Social Status

Several of the farmers we have talked to have been among the first in their neighbourhoods to try the PPT. When they have successfully implemented the method, this has been acknowledged in different ways. Eyob tells about how he first got in contact with PPT and how his first try arrived to Mogez from ISD Dessie branch:

> Salomon: "When did you start with PPT?"
>
> "Three years ago. At the beginning I was thinking that it was an ordinary activity carried out by the *kebele*'s FTC, and I wasn't sure of whether the method was useful or not. I didn't have many expectations. But I saw others that took the training and I decided to try it. Then I immediately saw the results. So I talked to the extension people and told them about my experiences, and they were amazed. Then Mogez came, and he was surprised by the results and the improved yields. I wish I could show you the pictures, there were no pests at all in the field. The *farenji*, she came… I can't remember the name, I think she is a coordinator of this PPT project. I have also shown my neighbours… and since then I have demonstrated the method to other farmers."
>
> (interview with Eyob, 2015-04-08)

Eyob also adds that he was taken to workshops and meetings in Hayk, Dessie and Axum to tell about his success. To get attention and recognition from other people seems to be an important aspect. As Rihana earlier explained:

> "The first year I had used the (Push Pull) technology, I was taken to Konso. During this workshop I explained how I had done at my field and about my experiences. Mogez and his colleagues were all surprised by the results showed at my farm. Then I was taken to this workshop in Konso, I became a *model farmer*, and I have also been awarded several times. /:/ Mogez and his colleagues came by and asked me what I needed. He encouraged me. Even Sue came to my land in October when the sorghum was planted and took photos of the field. She took me to different places, for example Addis Ababa. I am happy when I visit new places…"
>
> (interview with Rihana, 2015-04-09)

Also Binyam highlights the value of sharing his experiences and showing others, as well as getting the opportunity to travel to other places:

> ”It is good when they call on me, I am happy, because we see new experiences, new things when we go there. So I can arrange my time and attend there. Especially when we visit other places than this, I am happy, because it is experience sharing. It is very important.”
>
> (interview with Binyam, 2015-04-08)

These farmers all point on the value of being chosen, to be a successful farmer and to be someone that gets this recognition from outside the local setting. To be able to travel and see new places is highly regarded. To be the one that shows to other farmers what to do is also manifesting this successfulness and being important, as well asbeing able to share experiences with other successfuls alike is. To get visitors that are *farenji* is also emphasised, which the quote mentioning Sue also refers to, as she is the white-skinned person which is the director of ISD. Following the same reasoning, our own visits to interview the farmers may also have put recognition to these farmers' doings and successes, since we are both from university and as well *farenji*. Thus, this impact of the PPT project, at least on these farmers, is more of the 'soft' type, addressing social status and well-being outcomes of livelihood strategies. Though social status or the feeling of good performance or success are harder to measure, they can still be a crucial contribution to the livelihoods of farmers.

To be the important one recognised by the *kebele* employees, the *woreda* official or the representatives of ISD, can be a way to get more advantages compared to just be a farmer among others. By this you can get experience by meeting others, get the opportunity to travel, and always be among the first to try new techniques or receive whatever advantages or resources that may be provided by the state or NGOs. To involve in the PPT project may not only result in advantages of that specific project, it can open new doors, possibilities and contacts which can be very important for improving the livelihood in the long run.

This way of gaining recognition and striving for social status, is also used strategically by the state organisations. The so called *model farmer*s, that for instance Rihana said she was appointed to, is an example of this. The *model farmers* in each *kebele* are elected for their achievements and their openness to try new technologies. Once elected you are automatically among the first ones invited to trainings and meeting at the FTC. You work closer to the DAs, and by so you will get more help from the expertise than many other farmers. To continue to be a *model farmer* you need to perform well not to risk not being elected the next time. The idea of *model farmers* is also that they should instruct and influence other farmers, and actively be a good example for others. In this way, the state, or ISD in this case, effectively teach new technologies to a smaller group of farmers for them to further spread it among their fellow farmers. Farmer-to-farmer communication is also regarded as more efficient than expert-to-farmer communication, which is the idea behind the *model farmer* system.

6.9 Vulnerability

The Sustainable Livelihood Framework addresses the vulnerability aspect of livelihood strategies. A vulnerable context can affect the livelihood activities, in the sense that people tend to make other decisions and priorities when crisis or abrupt changes occur. A vulnerable situation in general also influences peoples' livelihood activities in order to easier cope with future changes (Hajdu 2009:57-58). Departing from this approach, it also becomes visible in the case of the PPT-farmers in South Wollo. Mergya tells:

> ”The DAs have also a great role to play in the decision making. They may teach us and give us advices. Some people are only using traditional knowledge, they are tradition oriented. Before it was more rain in this region, but now the climate has been changed. There is an uneven distribution of rain. It rains when we don't expect it to. So, we use the advices that

> the DAs gives us. And when we see the benefits, or the improvements from the new technologies, the others also follow, and they leave the traditional technologies. /:/ In the past nature was very good. It provided everything that we needed. There were no insects. *Keremt* was good. And we could harvest what we had sowed, there were no big variations in yields. But now, nature has changed. For example the drought. There is a shortage of rain, and uneven distribution of rain. And there are so many insects in the farmland. To grow pepper in our area nowadays is very, very difficult, because of disease. Before it was almost overproduction here. Before a farmer produced 20 or 30 *quintals*! We had so much food collected in big heaps that we could even shoot on it with guns! But nowadays, the seasons are challenging us. The drought, the diseases, the insects, they are the reason why the government recommend us to use improved varieties, different methods and short-period-varieties. So almost everything is different now."
>
> (interview with Mergya and Tsegereda, 2015-04-14)

Although stories about that it was better in the past are very common in general, there is no doubt that farmers in this area perceive a change in the climate and an increasing insecurity regarding the rains. As agriculture here is highly determined by rainfalls, this unreliability of the rain is a severe stress factor for farmers. Changing climate conditions is one factor that puts these farmers in an even more vulnerable position (cf. Haakansson, 2009:36-42, WFP:6). The quote by Mergya also displays how he and farmers like him relate to these changes. Insecurity in how to handle this situation makes them seek the help provided by the *kebeles* and the agricultural experts. These provide technologies that are believed to better suit a changing climate. Even if PPT is not addressing adaptation to climate change in the first place, it is still one of these technologies taught to farmers that get a higher level of interest and importance from the perspective of the farmers themselves, in times when challenges arise. This is shown by how Mergya talks about these technologies and climate change, making no strict demarcation between the technologies and their relation to changing circumstances. The role of PPT and other technologies alike, may play an even more crucial role as unreliability of rain and climate change most probably will increase rather than diminish in the coming future(cf. Haakansson, 2009:32-35, WFP:39).This does not say, however, that the technologies actually will help the farmers adapt to a changing environment. It just says that the trust the farmers put on these technologies increases, since the methods to trust normally, or the 'traditional knowledge' that Mergya refers to, are not as reliable any more.

4 PPT and Poverty

Six out of nine farmers interviewed are so called *model farmers*. The meaning of *model farmers* does not implicitly mean that they are the wealthy ones, or the ones with more access to land than others. It simply means that they are open to try new technologies. However, *model farmers* tend not to be among the poorest of people from what I have understood from my field experience. To be a *model farmer*, you need enough land and resources to be able to try new technologies, in other words some space for action and choice compared to marginalised people without this possibility. This idea is also supported by Tesfaye's division of the village people in Pasomille. Tesfaye, the Pasomille DA, talks about which farmers to invite for training in the FTC:

> "The first time the *model farmers* are selected, they are the best ones to participate. Second, it is the farmers of good status, the better off, following that. The third one, /:/ they are poor participants, poor farmers, the passive ones."
>
> (interview with Tesfaye, 2015-04-14)

Tesfaye's ranking makes clear that *model farmers* are not necessarily among the absolute top, but they are definitely not among the poor people, the third category.

The idea behind using *model farmers* for reaching out with new technologies is that they will spread the technology to their fellow farmers, which in its aim is a more effective way of spreading than to teach each and every one of the farmers. This is a system used by the Ethiopian state, as well as by ISD. But does this system really reach the other farmers to a sufficient extent?

There are many examples where our informants have shown how the technologies spread. Especially neighbour communication is important for the spreading, since it is very easy to see what neighbours are doing and copying their good results is often a natural outcome. Here, *model farmers* play an essential role in being the first ones to try a new technology, which can be copied by neighbours and further copied by others.

However, we have also met other perceptions challenging this idea. Firstly, Tesfaye's quote above also displays a hint of the attitude that we often have met towards the poor people. It is an attitude among the farmers we have interviewed as well as the DAs. The poor people are lazy, they are passive, they are 'hopeless' and they are not really counted in the full picture of the population in the villages we have visited. When Tesfaye draws figures about the population in Pasomille, and shows statistics on paper sheets spread out over the walls in his office at the FTC, it is clear that the poor population is not the main focus of his work. He keeps talking about the *model farmers* and the better-off, shows numbers of which trainings they have attended and their results, but only sweeps over the statistics of the poor. When we ask explicit about the poor, it becomes clear that they make out a significant part of the population in Pasomille. The Productive Safety Net Programme (PSNP) is a state programme where poor people, who cannot sustain themselves throughout the year, work with improvement of infrastructure and society services in order to get food or cash in return (Haakansson, 2009:66-68). In Pasomille, the ones involved in the programme consist of a third of the total population, according to Tesfaye's statistics. There

are often three to four individuals from each family or household that are involved in the programme, since the agriculture or the other main livelihood activity that contributes with the rest of the income, still needs to be maintained and cannot simply be abandoned (cf. Haakansson, 2009:73-75). Consequently, the individuals dependent on the programme within the respective households are a larger number. Thus, the part of the population that can be regarded as poor in Pasomille is possibly even larger than a third. Poverty is here derived from the idea that these people involved in the PSNP and the rest of their households do not have the capabilities to sustain themselves without the help of the state programme.

The fact that the DA in Pasomille does not seem to direct his work towards the poor that much, and see the poor as lazy and passive, adds to a picture that the technologies like PPT are not primarily aimed for the poor.

This understanding is also supported by the DA in Gobeya, Omar, who during our interview shows a table over the different livelihood characteristics, and their places on a 'richness'-scale. 25 percent of the population is regarded as the poorest of the poor, and totally 45 percent is placed within the category of the poor in general. Here, poverty is again defined as not to be able to sustain oneself throughout the year. When I ask who the PPT is mainly addressed to, he points at the two richest categories of people in Gobeya, which make out 10 and 20 percent of the population respectively. The reason why, according to Omar, is that these have the right livelihood characteristics, i e. enough share of crop production and enough access to land to be meaningful. However, when studying the livelihood characteristics table, the crop production is still of the same quantity for the second richest and the third richest category. Although the argument may be valid for people that do not have the resources to apply the technology, it is obviously not for the third richest category. Thus, this points on the fact that there are certainly more people that would benefit from the PPT than are actually addressed.

To get a more comprehensive understanding of PPT and the situation of the poor we wanted to interview persons that were not *model farmers*, and not among the top equivalent to the first and the second of these categories that Omar talked about. This showed to be quite hard to arrange, as the key persons at ISD and at the FTCs we used for getting in touch with our informants often did not have telephone numbers to, or contact with, these people. As a result, we ended up time after time interviewing another better-off or *model farmer*. This fact alone is a telling example of that these people are neither that well addressed, nor really counted when it comes to PPT and other projects alike.

Finally, we got an interview with the farmer Said. It is hard to place him on the scale of Omar's table, but the fact that he is not a *model farmer* and has not been part of the PPT Project, and that he has a son within a project addressed to marginalised youth without access to land, we thought we were somewhat on track.

When asking about *model farmers*, and what Said thinks about them, he says:

> "That's a good thing. If they are active and participate they will be called a *model farmer*. Only *Allah* knows about their wealth."
>
> (interview with Said, 2015-04-21)

He says it with a laughter, and we all start to laugh a little. What he indicates is that *model farmers* are not always chosen because of their openness to new technologies, there can be other aspects also having an influence, like the farmer's general social status and position in the *kebele*, or for example loyalty to the government party. This is a view we have met from several persons during the field study, parallel with the other view of *model farmers* first mentioned in this chapter.

Said continues:

> Josefin:"Do you use to go to the *model farmers* and look at their farms?"
>
> "I don't go there. They don't ask me to, and even if they did I wouldn't go."
>
> Josefin: "Why not?"

"I am not interested of their work."

(interview with Said, 2015-04-21)

He says firmly, and he has anyway enough to do at his own farm to go around bothering about what the elected so-called *model farmers* are doing. He is never invited to the trainings at the FTC, they do not choose him he says. He adds that he mostly wants to work here at his farm, that is what is important to him.

Later on, Said talks about how he started with a new compost technology. It was after a visit from Sue Edwards, the director of ISD, who came to Said's farm and showed how he could advance his composting. He talks about how he has improved soil fertility in his land, due to the better composting, but also due to other techniques. He is proud that he and many farmers like him take better care of the land nowadays.

The interview with Said contributes with new perspectives important for a more comprehensive understanding. Firstly, it gives an example of that the *model farmer* system may not be able to reach all farmers. Secondly, it shows a mistrust towards *model farmers* that undermines the system as a successful way of spreading new technologies. Thirdly, it highlights the value of using other ways of reaching farmers, especially farmers that are not well connected with the *kebele* or are among the upper crust.

One question that appears after talking with Said is if it was not for Sue's visit at Said's farm, would he ever have started with these new compost practices?The same type of question could be asked when it comes to PPT as well. Although Said grows both maize and sorghum, his position of being not regarded by neither the *kebele* nor the *model farmers*, makes him isolated from new technologies such as the PPT. The mistrust against *model farmers* adds another dimension of the problem. It does not really matter if there is any ground to the suspicions, only that the suspicions exist hurt the system of *model farmers* severely. How Said will get the opportunity to know PPT remains an open question, at least as long as the same methods of spreading the technology are not complemented with other approaches.

To go through the *kebeles* and the *model farmers* is a strategic choice by ISD, partly because of the effectiveness in terms of the limited resources needed to spread to many farmers. Partly, it is also to use an already set up organisation, with no need to invent a new organisation to get into contact with many farmers. There are also advantages to work closely together with the state bodies, as the resources they provide and the expertise they have, can be utilised by ISD as well. The way ISD work, through being a pioneer in launching new agro-ecological methods and then trying to make the state adopt the methods, makes it crucial to work close to the state. This has been the case for several of ISD's projects, as well as for PPT. ISD is a small organisation with limited resources compared to the Ethiopian State, and to make such an organisation adopt ISD's work will be much more influential. For instance, the about 400 farmers in South Wollo who have tried PPT until now, will be scaled up to reach 20 000 farmers, by the help of the government. To work closely together with the state, with the *woredas*, *kebeles* and the DAs will thus facilitate the state's adoption of the projects and also make the shift of the projects' ownership easier.

When talking about reaching more farmers I think it is crucial to take Said's story into account. Who are these 20 000 farmers that will be reached? Are they only the upper crust of farmers? And moreover, will the "lazy", "hopeless" poor people be reached?

Seeing that the system of *model farmers* has its weaknesses and that the FTCs are not for all, together with the unfortunate common attitude towards poor people, calls for alternatives to reach farmers. At least, this is something to consider when viewing technologies like PPT in relation to the challenges of food and livelihood security and combating future famines. Because, as Webb and von Braun (1994:11) argue, famines do not affect each and everyone in the same way or to the same extent. Often the poor people are the most vulnerable to famine, and the ones who will suffer the most. Hence, if the state bodies' agricultural work has problems reaching these people, they will lack chances to

receive important help in order to be better suited for future challenges.If the PPT Project in future will try to address this problem, there is a higher chance that at least the PPT Project will contribute to reach more people, and the people that are more vulnerable to future challenges.

4 Conclusions

This study has explored how PPT has been perceived by farmers who have started using the technology. Firstly, it has described how PPT fits into the livelihoods of the farmers. Secondly, it has analysed the impacts of PPT through a livelihood framework. Thirdly, it has included a poverty dimension to address the issue of the people who have not even been reached by the technology and thus have not been subject to any impacts on their livelihoods due to the project. The paper has discussed a number of concluding points that will be summarised here.

Although higher yields is the main objective for the project, the multifunctionality of PPT is a strength that cannot be underestimated, and an aspect that is highly regarded by the the farmers. The PPT is adapted to the multifunctionality of the farmers' livelihoods and developed to suit the needs of the farmers, which makes the project successful.

PPT is one of many projects addressing farmers and having impacts on their livelihoods. The farmers themselves do not differentiate between them, and for understanding the farmers' approach to projects like these, you need to see PPT in this context.

The PPT focuses on maize and sorghum, two food crops which are important for home consumption and the food security of the household. Nevertheless, there is a market for maize and sorghum which means that the PPT also can have an effect on the monetary income of the household. It is important to recognise both the households' needs of obtaining cheap home produced food as well as having a monetary income in order to pay for other needs.

All the farmers studied are mixed-farming agriculturalists who almost exclusively rely on farming for their livelihoods. This makes the value of PPT quite similar to all the farmers, at least on a basic level. However, small differences in the farmers' livelihood strategies put different emphasis on PPT and in which way it is valuable to them. The farmers' different livelihood assets have a great impact on how they will receive PPT.

Personal interests and priorities are very essential to take into account when studying the impacts of projects like this, since what people strive for will affect their different livelihood strategies and thus the relevance of PPT. Here, overall aims for living a good life plays its role, whether it is contribution to the local village that is important, or a future life in the city. Also the knowledge about your children's possibility or interest of taking over the farm is a factor.

Personal strives, for example the strive for independency, have been crucial for some of our informants. It is both an important driving force of wanting to take part in the PPT Project, and it can also result in a feeling of well-being and success if the participation in the project fulfils the expectations. The strive for independency is something that can be seen in the context of this area's history of droughts and famine. The wish to be once and for all finished with these problems, stop receiving aid and be able to stand on your own legs is an idea that can be seen in the context of the whole region.

The PPT has also been found to change intra-household relationships. Power relations and different interests within the household are something that affect the livelihood activities and outcomes. In this case PPT and the support provided from outside have acted

as a force to change the power structure in favour for the more open-minded development-striving woman of the household, which seems to have meant a lot for the progress of the household. To be aware of intra-household relationships is crucial to understand both motives of participating in projects like PPT, and also to detect how impacts can differ between households.

Overall structures of society are also a determining factor of how PPT is received and how its impacts are felt. Overall structures that have been discussed during this study have included urbanization, gender issues, food culture and norms about what a good farmer is. Moreover, talking about structures influencing the farmers, the Ethiopian state is a key actor. PPT is now going to be one of the technologies that the state actively advocates. Although there are few regulations on what and how to grow, the state campaigns push farmers in a, to them, favourable direction, having a significant impact on farmers' activities. Related to PPT is the state's encouragement to grow more cash crops, which have important advantages but can also be risky for farmers with small margins, as they are very dependent on the often fluctuating prices. The incentive to grow cash crops, plus the encouragement from the state, may together result in a higher risk that cash crop production turns out to be over dimensioned in relation to what is a feasible level.This can in turn have negative impacts on food security at both household and regional level. PPT's contribution to this is to increase incentives for growing maize and sorghum, two food crops, and therefore can help balance different incentives in a time when both fruit tree and chat plantations are expanding in this area.

The PPT project has been important to the farmers also in the more unmeasurable way, providing feelings of success, good performance and recognition from farmers around them. Attention has also come from agricultural experts, *woreda* officials, ISD-workers and people from far away, like me. Getting this attention for what they have done is for the farmers themselves an evidence of success. These factors can be important contributions for their livelihoods, both direct and indirect. Indirectly, success within PPT has brought farmers to new places as well as new knowledge and experience sharing with other farmers and experts. A success within PPT can also open doors to get more help, expertise and access to resources in future.

In a vulnerability context, PPT has another additional meaning to farmers' livelihoods, being a technique among many that farmers put a greater trust in during challenging times. The worry about climate change and unreliability of rain make farmers adopt and trust new technologies provided as they perceive they have not that many of the already tried-out alternatives left to trust. This makes the importance of these technologies even greater.

Adding poverty as a dimension into this study, there is some evidence showing that if ISD continues to spread PPT in the same way they have done until now they might risk to miss out a large number of farmers. The farmers left behind are the farmers who are not among the 'upper crust', who are not working close to the DAs and who are not in contact with the *model farmers*, the *kebele* or invited to the trainings held there. Those are the farmers that are not placed in the upper categories on the richness-scales the DAs work with in the *kebeles*. Those people do not have the same capabilities as the others. Translating 'those' into numbers, the findings in this study points in the direction that it is roughly about a third up to half of the population. The fact that many of the poorer people do not seem to be reached, together with the unfortunate attitude towards the poor that I have met from several people during my field study, raise obstacles of reaching out with PPT. These obstacles need to be erased or by-passed, in order to reach the people that are both high in number and are more vulnerable when it really matters.

To raise productivity is by all means a desirable aim in South Wollo, Ethiopia. The PPT tries to contribute to this by being a preventive method to eliminate yield losses of maize and sorghum to two hazardous pests. The way this is done is an impressive example of how plants, animals, humans and the environment interact in a technology. PPT does in other words take into account many different aspects which is put together to a technology that

has many more advantages and outcomes than the single one of raising yields. This is also what agro-ecology is all about (cf. Silici, 2014:14).

Although PPT has been put together regarding all these different aspects and their importance, the impacts have not been studied taking into account its full width. Some yield data has been collected, but what other outcomes there are have not been further studied. Again, higher yields are crucial. But for whom? If the farmers themselves do not perceive advantages of higher yields, or if the tools to reach higher yields do not fit into farmers' livelihoods, then there is something wrong to a project in agro-ecological means(cf. ibid.).To get the full picture of the outcome of this PPT Project, more studies need to be conducted. However, this study has contributed a picture of what some farmers involved have perceived of its outcomes and how the project's socio-economic impacts can be understood through a livelihood perspective.

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