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Justification and underlying motivations in choices for inputs of farmers in Busia and Vihiga, western Kenya

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Student Anne Y R M van den Berg - 881006 052 160

Supervisors Dr. ir. Conny J M Almekinders

Wytze Marinus MSc

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Summary

Smallholder farmers often find hit hard to reach food-self-sufficiency for 12 months per year. Adoption of new technologies in agriculture, i.e. microcredit and seed systems, are often below expectation while these technologies have the potential to offer a way out of poverty. The decisions farmers make are often unexplainable in the eyes of involved researchers, which assumes a lack of understanding on the researcher's side on the underlying motivations, or the *why*, of choices. Simulation models likes NUANCES-FARMSIM can simulate the effects of choices farmers make on farm level and thus in *what* choices farmers make but leave out the underlying motivations for these choices.

Selected farmers in Vihiga and Busia county, western Kenya, participate in a research project which aims to understand *what* choices farmers make. The farmers receive a voucher of USD100 which they can spend on selected inputs and participate in a co-learning trajectory. The 25 participating farmers participated in this research and are interviewed about the *why* of their choices.

The World Development Report 2015 (World Bank, 2014) distinguishes different variables which all point in the direction that people make automatic decisions based on what is satisficing, social norms, and history and cultural beliefs. To tap into this tacit knowledge, laddering technique is used during interviews. This resulted in *a functional justification* for the choice, and by repetition of the question why that is important, several times, into personal values. Not all farmers said to know the answer to the question why a certain previous was important to them. This might be modesty which is related to culture, or an underlying feeling that the 'right' answer might give a chance on gaining participation in a project or receiving inputs for the farm, as a result from previous NGO intervention in the area. Though the answers did not always result in a personal value as such, it is assumed that the last answer given, still gives insight in the *underlying motivation* for the choice farmers made.

The underlying motivations for choices show a dichotomy between answers which fit in a farm management optimization narrative and answers which are focused on aspirations outside the farm. However, most of the answers from the laddering interviews point in the direction that farmers make choices with which they aim to make economic optimum decisions. This is shown in e.g. the application of fertilizer and reflected in the motivation for intensification, e.g. farmers make choices aiming to get well growing plants and surplus which can be sold. Both with the *underlying motivation* to reach food security and/or earning money to allocate to personal needs such as paying for school fees, and/or buying household items, and/or paying medical bills. However, in interpreting these results, it should be considered that farmers are participating in a project in where they are enabled to share their experiences and learn from fellow-farmers and scientists.

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List of abbreviations

B	Busia
DEED	Describe, explain, explore, design
DK	Dekalb
DM	Dairy meal
DO	Dairy other
GRQ	General research question
HH	Household
K	Potassium
LR	Long rains
N	Nitrogen
NUANCES-FARMSIM	Nutrient Use in Animal and Cropping systems – FARM SIMulator
OAF	One Acre Fund
P	Phosphorus
RO	Research objective
SR	Short rains
SRQ	Sub-research question
V	Vihiga

Chapter 1 Introduction

Smallholder farmers in western Kenya generally reach maize self-sufficiency for around 6 to 7 months per year (Tittonell et al., 2005, Valbuena et al., 2014). Due to small farm sizes and limited input use, their own food production is often too low and/or too variable to produce enough to be self-sufficient (Hengstdijk et al., 2014), let alone sufficient to have considerable surplus for the market. The use of technologies for sustainable intensification (e.g. seed systems, microcredit, fertilizer use), is often seen as the way out of poverty and reaching food security. But often the adoption of these technologies does not result in considerable income gain (Ritzema et al., 2017) and adoption of the technologies remains low (Glover et al., 2016). In other words, choices made by farmers are often perceived as less economical optimum decisions. Mausch et al. (2018) argue that in understanding why some farmers adopt, while others reject, new technologies, more factors than financial resources, information and markets, needs to be considered. They explain this by stating that people use the 'the rule of thumb' in decision making and that there are several variables which are influencing decision-making and behavior. Based on the World Development Report 2015 (World Bank, 2014) they describe them as follows: (i) people make quick automatic decisions operating within a 'satisficing' rather than optimizing model, (ii) social norms influence choices, and (iii) historical learnings and cultural beliefs shape perspective. This suggests that choices are made based on intuition rather than on an economic narrative.

However, while a large share of agricultural technology development continues to focus on yield improvements and increasing productivity in order to improve food security (at both national and farm level) and reduce poverty, researchers try to understand *why* farmers decide to use or not use, or partly use the opportunities that are available to them to improve crop productivity. To support farmers to increase their farm productivity, their motivation for decisions in farm management need to be better understood. Simulation models like NUANCES-FARMSIM can simulate the effects of farmers' management decisions on farm productions (Van Wijk et al., 2009) and consider the complex interaction between farm components (e.g. different fields with different crops, livestock). It aims to unravel and understand part of the complexity of farming systems in sub-Saharan Africa. It can be used to assess long and short-term effects of management decisions and technologies, before they are implemented on the farm. Tools like FARMSIM can help to visualize and compare outcomes of management decisions on a rational level (Marinus, 2017). In other words, NUANCES-FARMSIM can visualize *what* farmers can do (technically) and the effects of these choices on the farm and therefore can be used to help farmers in their decision-making. It does however not consider social norms and historical learning for instance, and therefore doesn't simulate the complete decision making. Therefore, it becomes more relevant to understand *why* farmers make those choices, when tools like NUANCES-FARMSIM are used.

To understand *what* farmers chose in their farm management choices, a study is executed in western Kenya whereby farmers are given a US$100,- voucher (Marinus, 2017). This voucher can be spent a on a variety of inputs; seeds, fertilizer and dairy farming inputs (see table 1). Part of the farmers who participate in this study are coming together in co-learning trajectories, a part of them are not. Within these trajectories farmers and researchers discuss options on farm management level among each other, using the DEED-cycle (Descheemaeker et al., 2016). This cycle is a tool to; *Describe* farming systems, *Explain* current yields and production systems, and *Explore* different scenarios per farm type

and how it this results in different *Designs* (Marinus, 2017). Repeating these co-learning cycles for several seasons (each season is a cycle) is expected to give researchers insight in the choices farmers make.

By studying the underlying motivations for the decisions which farmers make (in other words the in other words the *why*) in their farm management, this research aims to support researchers to develop new products and services for farmers to reach food security.

1.1 Problem statement

Adoption of new technologies among smallholder farmers is in many situations below expectation, and decisions of farmers are often unexplainable, in the eyes of researchers. This assumes a lack of knowledge on the researcher's side on the underlying motivations (or the *why* of choices) of farmers to (not) adopt practices that result in higher productivity. In this research, carried out in western Kenya, smallholder farmers' decisions in farm management is studied.

1.2 Research Objective & Research Questions

Research Objective (RO)

The objective of the research is to contribute to the understanding of decisions made in farm management by investigating the underlying motivations of choices among smallholder farmers in western Kenya.

General Research Question (GRQ)

What are farmers' motivations underlying the choices for inputs, chosen with the use of project vouchers, in Vihiga and Busia county in Western Kenya?

Sub Research Questions (SRQ)

SRQ 1 What is the justification for farmers for their choice of inputs which they choose with the voucher?

SRQ 2 Which underlying motivations do farmers have for their choice of input?

Chapter 2 Background

Using NUANCES-FARMSIM for co-learning in maize-based farming systems of western Kenya (hereafter; the project) is a PhD project executed in two counties in western Kenya: Busia and Vihiga. These counties were chosen because of their differences in agro-ecological and socio-economic characteristics (Marinus, 2017). Their climate is slightly different. Busia has an annual average rainfall of 1691mm by an average temperature of 22°C, while Vihiga is experiencing an average rainfall of 1921 mm per year and bit cooler with an average of 20°C. However, both counties experience a long rains (LR) season from March to June and a short rains (SR) season from October to December.

In each county two sub-locations were selected based on their comparability (between the two sub-location in a county) considering the following variables: farm size, number of livestock owned by the household, and crops cultivated. Selection was based on earlier surveys in both counties, the IMPACT-lite survey in Vihiga (n=200) and the FEAST survey in Busia (n=30). Selected sub-locations were geographically far enough from each other that it is unlikely that farmers will discuss their participation. This will prevent the group without co-learning trajectory (sub-location one) to be influenced by the group who is participating in the co-learning trajectory (sub-location two). From the earlier surveys a stratified random sample was taken for three different farm types (see 2.1 *Interviewee selection*).

All participating farmers received a $100 voucher to spend at the start of the season on a selected number of inputs. In table 1, all available inputs per season are clustered. There are three categories inputs: seeds, fertilizer, and dairy farming inputs. In workshops, farmers and researchers discussed the different inputs, and the availability for the following season was adjusted according to the outcomes of these discussions. As a result, groundnut and sorghum were introduced, and maize and bean varieties changed over time. All seeds are either hybrid or improved varieties and can be found in agro-vet shops in the region. For fertilizer, there were different types, and several quantities available. This enabled farmers to choose according to their farm size and needs. For maize there was CAN & DAP (preferably used together, therefore merged in this research) available, for soya bean, groundnut and beans there was Sympal available, and for soya bean there was Biofix inoculant available. The category *Dairy farming inputs* consists of *Diary meal* and *Dairy input other*. *Dairy meal* is the Kenyan-English name for a concentrate made out of grains. It is used as a supplement for feed to complement protein intake for lactating dairy cattle. *Dairy input other*, clustered four (4) different inputs which are linked to dairy cattle; Calliandra seedlings, Desmodium seeds, manure sheets, and silage bags. The table's last column shows whether there were different varieties or different quantities to choose from. The assumption is that the voucher enables the farmers to buy inputs for their farm which otherwise would be out of reach.

Table 1: Overview available inputs per season for Vihiga and Busia

Input/season	2016SR	2017LR	2017SR	2018LR	Quantity/ variety
Seeds					
Maize	9	14	10	14	V
Soya bean	2	2	3	3	V
Groundnut		1	1	1	V
Sorghum*			2	2	V
Bean		2	2	3	V
Fertilizer					
CAN & DAP	3	3	3	3	Q
Sympal	3	3	3	3	Q
Biofix inoculant	3	2	2	3	Q
Dairy farming inputs					
Dairy meal	3	3	3	3	Q
Dairy input other				4	V

**) Sorghum was only available in Busia because the climate in Vihiga is not suitable*

Chapter 3 Methodology and methods

This research is concerned with motivations of decisions that farmers make, this requires the *why* farmers are doing what they do, and therefore qualitative research methods seem most suitable (Robson & McCartan, 2016). However, to analyze the decisions farmers make, it is also needed to understand *what* they are doing and using, therefore the use of quantitative data is needed. This gives way to use a mixed methods approach (Robson & McCartan, 2016). The interview techniques which are chosen (see; *Methods, data collection*) ask from the researcher to concentrate on the reality which the farmers are describing but they will be interpreted by the researcher. Interviewing about motivations implies the acceptance of multiple realities and thus subjectivity. This asks the researcher to take a reflexive position. During the data analyses phase it is important to use some critical self-reflection (Finlay & Gough, 2008) on how the researchers' behavior has influenced the interviewees.

2.1 Interviewee selection

Within the project there were two groups of farmers: those farmers who participated in the co-learning trajectory (group A) and those who did not participate in the co-learning trajectory (group B). These groups were grouped according to farm type; a farm type is defined by the livestock which is owned by the farmers (Marinus, 2017). The first farm type (1) are those farmers with none or very little livestock. The cutoff point is that the farmer does not own more than the equivalent of one cow. The farmers in the second farm type (2) own at least one local cow, but no dairy cattle (pure and cross-bred exotic dairy breeds are considered dairy cattle). The farmers in the third farm type (3) own at least one dairy cow. Some of the participating households changed farm type during the project. In group A, all participating farmers from both locations were interviewed, group B was not included in this research to avoid a testing-effect in the project.

Table 2: Selection of interviewees per county according to farm type

County	**Vihiga**			**Busia**			**Total**
Type of farmer	None (A1)	Local (A2)	Dairy (A3)	None (A1)	Local (A2)	Dairy (A3)	
Interviewees	4	6	3	4	4	4	25

In Vihiga county there was a number of 13 farmers interviewed; four with farm type 1, six with farm type 2, and 3 with farm type 3 (see table 2). For the 2018LR, they had the choice out of 39 different quantities/varieties of inputs, in 10 different categories (see table 1). Sorghum was not made available for farmers in Vihiga because there is too much rainfall and therefore the area is less favorable for sorghum. An overview of the choices farmers in Vihiga made can be found in table 3.

Table 3: LR2018 choice for inputs of farmers in Vihiga

Input / Farmers	**Maize**	**CAN & DAP**	**Beans**	**Sympal**	**Soya beans**	**Ground-nut**	**Biofix inoculant**	**Dairy meal**	**Other dairy inputs**
All (13)	13	13	10	9	8	8	7	5	8
1 (4*)	4	4	3	3	2	2	2	0	1
2 (6*)	6	6	5	4	4	5	3	3	4
3 (3*)	3	3	2	2	2	1	2	2	3

**) total number of farmers per farm type*

In Busia county, a total of 12 farmers was interviewed; per farm type, four farmers. Like in Vihiga county, they had the choice of 39 different inputs varieties/qualities during the 2018LR. Table 4 shows the choices that farmers made. Two category one famers choose dairy inputs for their farm; during the interviews they explained that they use the Calliandra seedlings to make firewood which is either sold for cash or used as firewood. While maize is a staple crop in the region, two out of 12 farmers did not use this input in 2018LR. They explained that they had their own means to provide for seeds. The seeds they bought were the same variety as provided with the voucher.

Table 4: LR2018 choice for inputs of farmers in Busia

Input / Farmers	**Maize**	**CAN & DAP**	**Beans**	**Sympal**	**Sorghum**	**Soya beans**	**Ground-nut**	**Biofix inoculant**	**Dairy meal**	**Other dairy inputs**
All (12*)	10	11	8	7	3	4	7	9	3	5
1 (4*)	4	4	3	3	3	3	2	3	0	2
2 (4*)	4	4	3	2	0	1	2	4	1	1
3 (4*)	2	3	2	2	0	0	3	2	2	2

**) total number of farmers per farm type*

2.2 Data collection

The data collection took place during the LR2018 season and it consisted of two phases: the first is a farm walk to analyze farm structure and farm management, and how the voucher is used. Besides, it has the potential to establish a relationship between the researcher and interviewee which allows for open communication during the interview. The second phase of the farm visit consisted of a laddering interview based on the choices for the inputs. A complete overview of which choices are questioned is included in annex 1. The data for these choices is gathered within the overall project and made available for analyses prior to the field work. The interviewing protocol for the laddering was as followed:

- Q1: Why did you make this choice?
- Q2: Why is it important for (input name) to have/be …. (justification) rather than …. (contrast to the justification)?

The answer to the first question provides an attribute or a *functional justification* for a certain choice, while the second question (and repetition of the second question) presumably relates to a *value* for the interviewee. It is assumed that these values are a trigger to choose for certain products (Kelly, 1955; Bagozzi et al., 2000) or in other words, the *underlying motivation* for choosing inputs. All interviews were done by the researcher and an interpreter who is fluent in the local language (Luhya) and the national languages (Kiswahili and English).

2.3 Data analysis

All the interviews were summarized and unclarities were discussed with the translator. The answers from the interviewing protocol were gathered in a diagram per input per county. The diagrams can be found in annex 2. The open question and other quotes were kept separately. From the diagrams, the answers are categorized (see C*hapter 4 Results*). All answers per input and their respective categories can be found in annex 3.

Chapter 4 Farmers' livelihood in context

To better understand the choices of farmers, also the context in which farmers operate needs to be better understood (Almekinders et al., 2019). During interviewing, it turned out that almost all farmers see farming as a second source of income and interviewing outside the farmers group, most people mentioned that farming is part of their life. Verkaart et al. (2018) came to a similar conclusion in a study in two counties in central Kenya. Almost three quarters of the participating farmers (n=624) described themselves as farmers. Most people interviewed in this study, both farmers from the research group as people outside the research group, explained farming is perceived as a need to secure household food security and are looking for innovative ways to extend their farm with poultry or dairy farming. This chapter aims to describe these farmers' livelihood and opportunities they take outside the project.

3.1 NGO's in Vihiga and Busia

Vihiga used to be a fertile area though currently facing decrease in soil fertility whereas traditionally Busia has had a low soil fertility. For this and other reasons (e.g. population density), many NGO's have selected this area as their project area. Agricultural intensification is possible and the possible increase in production would secure household food security. Therefore, the people living in this region are used to the NGO's-staff to be around and the ways they can benefit from them in terms of i.e. free items. It is reasonable to question the validity of the answers given by the farmers. There is no guarantee that they did not have in mind that the interviewer could give them more seeds, fertilizer, or dairy farming inputs. On the other hand, since the project is already running for several years, the interviewed farmers would probably also have seen the interviewer in a different perspective since they are used to being interviewed concerning their farms.

Part of the interview was a farm walk during which several farmers showed their neighbors' plot and specifically mentioning that those neighbors were using the services from One Acre Fund (OAF). OAF is a non-profit social enterprise, founded in Kenya in 2006, and have served over 230,000 farmers in wester and south western parts of the country. After the first year of operation, the organization extended the financing of agricultural supplies and training to smallholder farmers in Eastern-Africa, now serving over 760,000 farmers in 6 countries (oneacrefund.org). The philosophy of the organization is based on the complexity of rural poverty and aims to work in a holistic, long-term approach, using a market-based model. In figure 1, the operational model of the organization is presented.

Asset-Based Loans. Farmers receive high-quality seeds and fertilizer on credit, and we offer a flexible repayment system that allows them to pay back their loans in any amount throughout the loan term.

Delivery. We deliver inputs to locations within walking distance of every farmer we serve.

Training. Farmers receive training throughout the season on modern agricultural techniques.

Market Facilitation. We offer crop storage solutions and teach farmers about market fluctuations, so that they can time crop sales to maximize profits.

Figure 1: Operational model One Acre Fund (source: oneacrefund.org)

The farmers whom mentioned OAF, did that while pointing out their neighbors' fields. The plants in those fields did not look as good as the ones in their fields own fields. Some farmers brought up that it must be related to the information OAF participants receive on how to apply fertilizers. Upon asking, almost all farmers had a story to tell about a relative who had used the service of OAF and faced difficulties in the repaying process. They ranged from not being able to pay the asked amount of money till having OAF-employees visit the farm to confiscate items, in several cases worth more than the debt of the farmer. Besides, one farmer in Vihiga explained that OAF offers other products like solar panels and radio's. He explained that he is not interested in these products since he already owns them and, besides, does not see why he should buy at an organization whom will take the farmers' cow if he is unable to re-pay the loan.

By making agricultural supplies available in walking distance of remote farms, many farmers have gained access to these essential supplies. However, it should be considered that with these stories going around in the area, there are some people who are deciding not to use these services since and therefore be excluded from an opportunity to gain access to these essential supplies.

3.2 Seeds from other sources

Though there are several NGO's whom are working in the region, and while many of them working on agricultural intensification, there are still farmers who are using local variety seeds. From the farmers participating in the project, 15 out of 25 used seeds from other sources next to the ones they received with the voucher. Some of them were local seeds, some of them certified seeds from the local agro-vet. In one of the first interviews, the farmer mentioned that he is using local variety of bean seeds. Since it Therefore the interviews included the question whether farmers use seeds from other sources than the voucher. Some farmers mentioned straight away that they did not use other varieties; "*I have local maize but did not plant. Only the seeds from the voucher. The local varieties give poor harvest, have a lot of pest and the hybrids just give better yields*". In Vihiga there are as many farmers whom used their own seeds, as there are farmers who did not use seeds from their own. In Busia 9 out of 11 farmers used other variety seeds, table 5 shows an overview.

In both counties there was one farmer who did not answer this question. One of the farmers did buy other seeds but explicitly mentioned that they are hybrid maize seeds and improved bean seeds. The quantity of seeds she received in the program was not sufficient for the number of acres she has under cultivation. One other farmer mentioned the same for groundnut cultivation.

Table 5: Farmers in Vihiga and Busia who participated in the project and used other seeds next to the ones they were able to buy with the voucher (n=23)

Did you use other seeds?	**Yes**	**No**
Vihiga	6	6
Busia	9	2
Total	15	8

Figure 2 shows which seeds farmers used next to the ones they got from the voucher. In Vihiga most farmers used maize and beans from a local variety. While in Busia it was mainly the 'others' which are used. 'Others' include, groundnut, sorghum and cassava.

Figure 2: Percentages of crops that farmers in Vihiga (n=6) and Busia (n=9) who participated in the project, planted with seeds other than the ones they were offered in the voucher. 'Others' include groundnut, sorghum, and cassava. More than one answers per farmer was possible.

Following the ladder protocol, farmers were asked why these seeds are used (see table 6). In both Vihiga and Busia, farmers who use the local maize mentioned that the local variety matures faster than the hybrid ones, hence the preference for the local variety.

For the beans, farmers explained that they planted the improved variety but that because of the amount of rain, they did not do well and therefore they replanted the local variety. One farmer mentioned that the local variety was doing better but also that harvest was destroyed by the rain. One other farmer mentioned that she chose to plant the local variety, to compare them with improved variety but that, because of the rain, they are both not doing well. Once it was mentioned that the local variety is better tasting and more fulfilling than the improved variety which was offered in the voucher (sorghum).

*Table 6: Reasons farmers in Vihiga and Busia who participated in the project used other seeds than the ones they could buy with the voucher (n=15)**

Why did you use these other seeds?	*Vihiga*	*Busia*
Mature faster (maize)	**3**	**2**
Improved variety did not do well (beans)	**3**	
Have been using them for a long time (beans)	**1**	
Not (enough) given from the voucher (maize)		**3**
Compare with hybrid (beans)		**1**
Local variety is more satisfying (sorghum)		**1**
Total	**7**	**7**

**) more than 1 answer per farmer was possible & not all farmers had a reason for their choice*

Chapter 5 Results

This chapter shows the results from the interviews which followed the laddering protocol. These answers are complemented with information from the open interviews; usually to clarify the given answer or to describe the context of the answer. This chapter is divided into three sub-chapters according to the different categories: i) seeds, ii) fertilizer, and iii) dairy farming inputs.

Completed interviews resulted in a diagram (see figure 3 & 4) which show all the steps which connect the functional justification to the underlying motivation. The difference in complexity of the diagrams is related to the number of farmers whom chose the input and the difference between the answers which are given. All diagrams are included in annex 2, and to give an example, two diagrams are included here. In figure 6 the results from the participating farmers in Vihiga are included. All farmers in Vihiga chose for maize (see table 2) and, though their justification is fairly different, most of their underlying motivations are closely related. The diagrams include the answers which are given by the farmers, later on in the analysis process these answers were categorized, and a legend is included on the side.

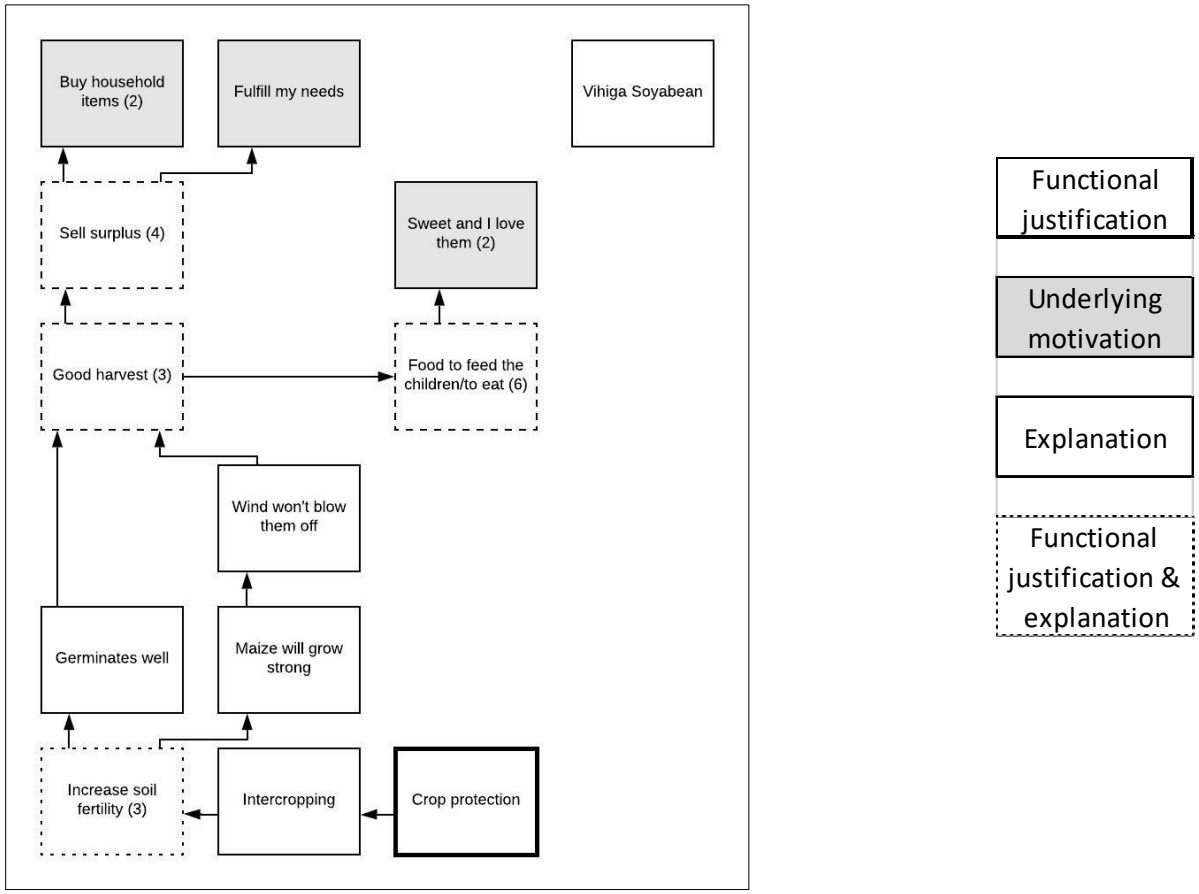

Figure 3: Functional justification and underlying motivation for the choice of soya bean in Vihiga county (n=8). More than one answer per farmer was possible.

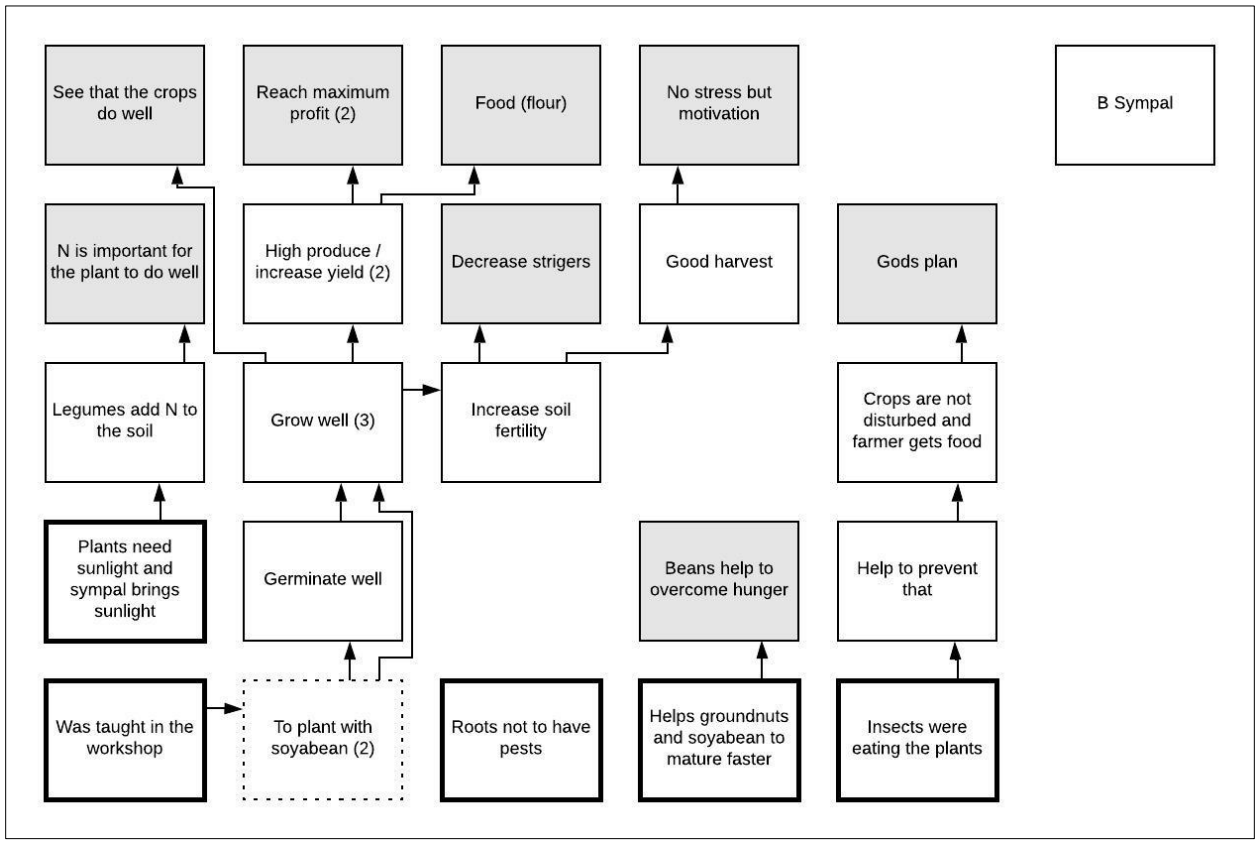

Figure 4: Functional justification and underlying motivations for the choice of Sympal for farmers in Busia county (n=7). More than one answer per farmer was possible.

5.1 Justification for the choice of seed

Comparing the reasons for choosing seeds as an input for farming (see table 7 & 8), it became clear that there is an obvious difference between Busia and Vihiga. First of all, within Vihiga almost half of the farmers chose for seeds because of reasons related to *agronomic traits* while in Busia almost half of the farmers chose for seeds for reasons related to *food security.* Next to this difference, in Busia famers seem to be more focused on *earning money from farming* compared to farmers in Vihiga. Busia farmers gave answers like: I chose this because ''*the costs for farming need to be covered* or *this crop sells for a higher price compared to e.g. maize*''. In Vihiga there were only four farmers who gave answers like that compared to 13 in Busia, that is four (4) times as much.

*Table 7: Comparison of functional justification for the choice of seeds in Vihiga (n=13) and Busia (n=12)**

Why did you choose for this input?		
	Vihiga	*Busia*
Agronomic traits	**20**	**10**
(Household) food security	**13**	**21**
Experimenting	**4**	**2**
Learning results workshop	**1**	
Earning money from farming	**4**	**13**
Total	**42**	**46**

**) more than 1 answer per farmer was possible*

5.1.1 Maize

From all participating farmers there was only one farmer who did not chose for maize. That makes this seed the by far most chosen and used. In the voucher there were several varieties available from different companies, these are all bundled in the category *maize*. The category a*gronomic traits* consist different answers which are related to the agronomic benefits of choosing maize. Farmers explained their choice of maize seeds in terms of ''*to get high yields*'' and ''*the germination of the plant is better*''. Some farmers chose for maize over another crop ''*because it matures faster*''. The answer *''it gives high yields''* is given five times; this is classified as *agronomic trait* because it points out that the farmer considers the traits of the seed as better performing than another one (see figure 5).

One of the farmers in Vihiga answered that he chose DK because ''*it does well in the farm*''. DK refers to the variety DK8031 which is produced by the company Dekalb. Nowadays, Dekalb produces several varieties but within the voucher, DK8031 was the only Dekalb variety available in the voucher. Whenever farmers mentioned a specific variety, it referred to the maize seeds they chose that season. Therefore all answers are clustered, and no other differentiation is made other than *maize*. One other farmer in Vihiga mentioned that he chose different varieties of maize because he wanted to *experiment* which one is the best. One farmer mentioned "*I can eat the maize*" while another one said, "*there will be hunger without maize*". Both of these answers are classified as *(Household) food security*.

In Busia, three farmers mentioned that they chose maize because they can sell the surplus to the market. This might be explained by the fact that farm sizes in Vihiga are relatively small compared to Busia. There is more chance to get surplus in Busia than in Vihiga and with the surplus, farmers can earn money, therefore it is categorized as *earning money from farming.*

5.1.2 Beans

In both counties, the number of farmers choosing bean seed was lower than those choosing maize (see annex 2). This might be related to the fact that you can re-use seeds for beans, soya beans, and groundnut, whereas it is advised not to re-use the hybrid maize seeds. In Vihiga, farmers mentioned that they chose beans because it gives a good harvest. Upon further asking, they explained that it is important because it will give them a surplus.

One farmer in Busia mentioned that he chose beans because it is a legume. Later on in the interview he explained that legumes are important because they add 'nutrients' to the soil. This means that the farmer chose it for the *agronomic traits* of the crop, rather than reasons which are directly related to food security. Some farmers also mentioned that they chose the beans because they *mature faster*. According to the scientist involved in the project, beans are often used as a food security crop as they mature in about 70 days, while maize takes at least 90 days. Other answers which are categorized as *agronomic traits* include; ''*best for the amount of rain''* and ''*they do well''.* One farmer mentioned that he ''*chose these beans because I wanted to see which one does best''*. This is categorized as *experimenting* because he chose the variety to compare them (see figure 5). Eventually he did not mention why this is important, he said that he just wants to try them.

5.1.3 Soya bean

To the question why people chose for soya bean, the answer ''*it is food''* was given most often in both counties (five times in Vihiga and three times in Busia, see figure 5). Other reasons had to do with the

fact that farmers want to make money; they either mentioned that they want to ''*sell surplus''*, or ''*it is very marketable''*. The latter referring to the higher price they can get for soya bean compared to maize or cassava.

Increasing soil fertility was the only reason related to *agronomic traits* for farmers in Busia to choose for soya bean while in Vihiga there were also farmers (3) who chose soya bean to get a good harvest. Either because they got a good harvest for their soya bean or they wanted to increase the soil fertility for future crops.

5.1.4 Groundnut

One farmer in Busia mentioned that she chose groundnut because ''*I have planted it for a long time''*. To better understand this, the next answers should be taken into consideration. It is important to the farmer because she can sell it and earn money with it. Therefore it is categorized as *earning cash with farming*. The same goes for a farmer in Busia who said that he chose groundnut for *marketing*; he explained this as the fact that there is a bigger market for groundnut than for maize. This also means, according to the farmer, that he can sell it for a higher prize.

5.1.5 Sorghum

In Vihiga farmers do not grow sorghum because the climate in the area is not favorable, it is too cold and there is too much rain. In Busia there were only two out of 12 farmers whom chose for sorghum in LR2018. One of them mentioned that he chose it because ''*it is food*''. The other one mentioned that he chose it because ''*I want to mix it with maize or cassava*''. He argues that, when sorghum is added to the maize flour, the ugali will last longer.

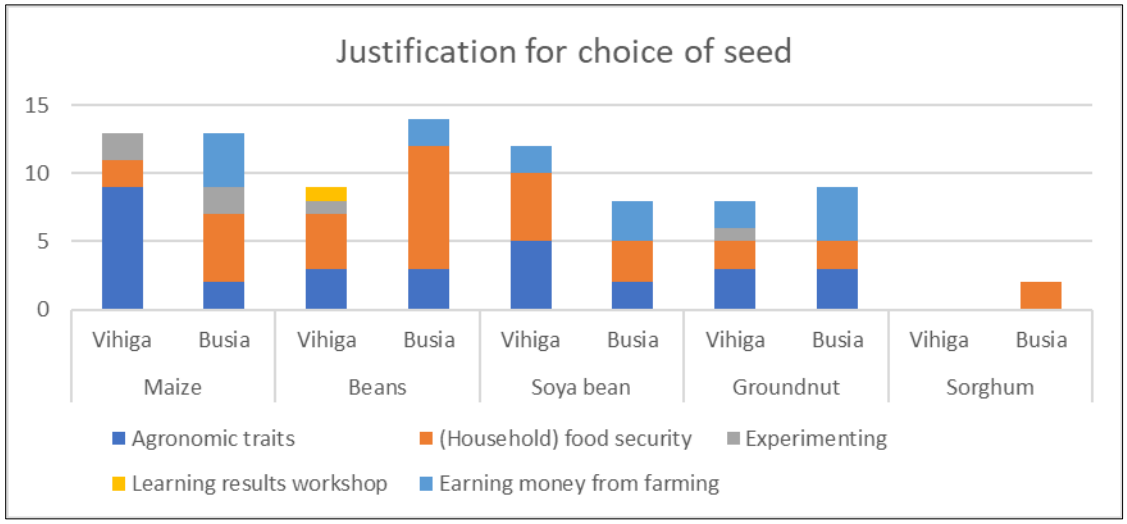

Figure 5: Justification for seed choice of farmers in Vihiga (n=13) and Busia (n=12) for seeds they chose to buy with the voucher in LR2018, more than 1 answer per farmer was possible.

5.2 Underlying motivation in seed choice

In Vihiga there are five farmers whom mentioned that the importance of their choice is related to the opportunity they have to invest in an African bank (see table 8). This is a term for the buying and selling of small poultry and livestock, such as chicken and goat and cows. Farmers buy them as an investment and substitute for the use of banking services; the latter is often too expensive to use. The eggs, milk

and offspring serve as interest and when cash is needed, it is easy to sell and have cash available immediately. In the category *seeds* this African bank is mentioned in Vihiga but never in Busia. This might be related to the way people express themselves. In Busia famers mentioned explicitly that they want to earn cash because they need it, while that answer was never given in Vihiga.

In Vihiga one third of the answers of farmers was related to food security while in Busia almost half of the answers were related to food security. Farmers motivated their answers with reasons such as *I need it for my family* and *otherwise there will be hunger.* But also answers related to food preference, one farmer mentioned that she prefers to eat beans over maize because the maize gives her health problems.

*Table 8: Comparison of underlying motivations in the choice of seeds for farmers in Vihiga (n=13) and Busia (n=12)**

Why is this important to you?		
	Vihiga	*Busia*
Invest in African bank	**5**	
Pay school fees, medical bills and/or household items	**11**	**9**
Give good feeling or motivates	**3**	**4**
Food (security HH)	**17**	**22**
Cultural environment	**2**	**1**
Experimenting	**1**	
Agronomic traits	**2**	**5**
Managing external risks	**3**	
Earning money from farming		**9**
Total	**44**	**50**

**) 1 or more answers per farmer was possible*

5.2.1 Maize

It is important to famers to choose for maize and beans because of food security reasons. For beans, *food security* accounts for almost 50% of the total given answers (see table 9). As mentioned before, beans mature in about 70 days, while maize takes at least 90 days, therefore it is a rational logic for farmers to see beans as an important help in reaching food security.

Upon asking why the justification of the choice in case of maize is important, most answers were no longer related to agronomic traits. One farmer said that '' *I do not want to look like a person without a brain''*. In other words, this farmer thinks that others, including the famers and scientist involved in the project, see her as someone with lack of knowledge when the crops on her farm do not look good. This is her perception of what she believes to be true. Other perceptions of what people believe the be true are "*when there is food, you do not have stress"* and "*God said it is important"*. Some farmers (3) mentioned that the good yields make them feel happy or it motivates them to continue farming.

Several times farmers mentioned that it is important to produce surplus. Upon asking why it is important to get surplus, eight farmers mentioned that they wanted to buy household items or pay medical bills, and/or school fees. One farmer described it ''as *everything which cannot be grown on the farm''*. However, for some farmers, their answers were not further motivated after they mentioned *getting surplus*. Those answers are merged into another category and it is assumed that their goal is to get surplus.

Those farmers in Vihiga who mentioned that they want to earn cash to invest in an African bank are merged into one category because it gives a purpose to getting surplus, it serves a personal goal for them. Farmers invest in an African bank because they do not have access to banking services. Oftentimes, it is too expensive to use these services because farmers need to pay money to withdraw money. Also using MPESA, a national mobile banking system, is often too expensive. Besides, this banking system does not give any revenue. Farmers refer to their small livestock, chicken and goat, as an African bank. They buy it, offspring and eggs are a small revenue while they can easily sell it when they need to pay bigger bills like school fees or medical bills. Milk is sometimes consumed in the household and sold when there is surplus.

Within agronomic traits, very specific answers were given. One farmer said that it is ''*important to get bigger grains''* while another one said that ''*it is important that the maize matures faster''.*

5.2.2 Beans

Only in Busia, farmers mentioned that beans are important because ''*they add blood to the system''*. Upon discussing this after completion of the laddering, farmers explained that there has been a health intervention whereby farmers were visited, and the health benefits of beans were explained. *Adding blood to the system* happens because of the nutritional value of beans, therefore, it is listed as *food security.* Some farmers specifically referred to their children*,* stating that they benefit from the specific nutrients.

Some farmers mentioned that they want to earn cash which they can use to buy goats and chicken (see table 8). Some say that it is important because it is an African bank while there was one farmer who said that it was important because ''*the cowshed can be improved with the manure''*. This answer is included in the African bank since it adds to the diversity of the revenue of the bank.

One farmer mentioned that the justification for the choice is important because ''*it makes her feel happy and satisfied''.* This is categorized as *giving a good feeling to the farmer* since it is assumed that these feelings are positive experiences to the farmer.

Whereas most answers in the category *managing external risks* are related to the weather or market opportunities, one farmer mentioned that it is important to her that there fast maturing varieties because ''*I can avoid theft by local youth''*.

5.2.3 Soya bean

In Vihiga there are mainly two answers given to the question why it is important; either because ''*I like* [to eat] *soya beans*'' or ''*it can be sold and gives cash for needs like household items*''. In Busia there was a high diversity in answers; ranging from ''*I cannot eat the surplus''* to ''*I want to increase the yields''.* Most of the reasons are related to *agronomic traits* (3 out of 8, see table 9). Farmers mentioned that it is important to increase the yield or that without planting soya bean, there will be no soya beans to harvest.

One farmer mentioned that he chose soya bean because he wants to sell the surplus and that it is important because he cannot eat the surplus. This answer is categorized as *earning money with farming.* However, one of the involved scientists mentioned that an issue with soya bean is that, it is often difficult to market. For household consumption only a little is needed and therefore soya bean only has

a small local market demand. When farmers have surplus they need to look for 'big' buyers, e.g. animal feed industries in Kisumu which is half a day traveling by public transport from the area where these farmers live. This is in contrast with groundnut which has a big local market demand.

The category *give a good feeling* is extended with the answer that it makes the farmer *feel healthy.* It is assumed that feeling healthy is a good, positive feeling. Therefore it is categorized as *gives a good feeling.*

5.2.4 Groundnut

One farmer mentioned that he chose groundnut to sell it and that with the money he can buy CAN (fertilizer for maize). This way is he is not solely earning money from farming, but he assigns it to specific goals. Therefore this answer is listed as *pay school fees, medical bills and/or household items* (see table 8).

One farmer mentioned that another farmer had a good harvest. It is assumed that he chose groundnut because he thought that it would give him a good harvest too. A good harvest is the result of the *agronomic traits* of the seeds, therefore it is categorized as such. One farmer said that it is important to eat groundnut because the hospital said that it makes you feel good. This is categorized as *gives a good feeling or motivates.*

5.2.5 Sorghum

When asked why it is important, there emerged two categories; it is either important because *it serves to earn cash,* or it is important because *it supports in reaching food security.* One farmer mentioned that if there is not enough food, they need to ration which gives stress and hunger, indirectly he mentions thus that he wants to feel good. Also, mentioned often, is that when there is sorghum added to the flour for ugali, it is more satisfying.

*Table 9: Comparison of underlying motivations the choice for different seeds to farmers in Vihiga and Busia (n=25)**

Why is this important to you?					
	Maize	*Beans*	*Soya bean*	*Ground-nut*	*Sorg-hum*
Invest in African bank	**4**	**1**			
Pay school fees, medical bills and/or household items	**8**	**1**	**4**	**7**	**2**
Give good feeling or motivates	**3**	**1**	**1**	**2**	
Food (security HH)	**11**	**14**	**4**	**6**	**4**
Believe to be true	**3**				
Experimenting	**1**				
Agronomic traits	**2**	**1**	**3**	**1**	
Managing external risks		**2**		**1**	
Earning money from farming		**4**	**1**	**4**	
Total	**32**	**24**	**13**	**21**	**6**

**) 1 or more answers per farmer was possible*

5.3 Justification for the choice of fertilizer

In both Vihiga and Busia, *agronomic traits* was the most often mentioned reason to choose for a fertilizer. Answers ranged from *the plants grow well* and *improving soil fertility* to *it was the fertilizer available* or *it was given with the beans*. In both Vihiga and Busia, four (4) farmers mentioned that they chose it because they learned in the workshops that it is important to use fertilizer (see figure 6). Only in Vihiga, food security was a reason to choose for fertilizer.

*Table 10: Comparison of functional justification for the choice of fertilizer in Vihiga (n=13) and Busia (n=12)**

Why did you choose for this input?		
	Vihiga	*Busia*
Agronomic traits	**23**	**22**
(Household) food security	**2**	
Learning results workshop	**2**	**2**
Social environment	**1**	**1**
Total	**28**	**25**

**) more than 1 answer per farmer was possible*

5.3.1 CAN & DAP

For CAN & DAP, most of the answers both in Vihiga and Busia are related to the *agronomic traits* (see figure 6); either by answers like "*I want to have strong plants*'' or ''*high harvests*''. Four farmers mentioned that "*it must be taken with maize*". It was not specified whether that is an earlier believe or something they learned somewhere. However, the answer to the question *why that is important*, they all give answers related to the desire *to have a good harvest*. Therefore this answer is categorized as *agronomic traits.*

In Vihiga there are two situations in which farmers mentioned that they want to have yields which are sufficient to last to the next season. This might be categorized as agronomic trait (high yield) but since the answers to the next question, are related to food supply for the family, it is categorized as *(Household) food security.* In Busia there was only one exception; this farmer mentioned that she chose for CAN & DAP because "*I was taught in the workshop*''.

5.3.2 Biofix inoculant

For Biofix inoculant (containing rhizobia to enhance Nitrogen fixation for soya bean), there are two farmers who mentioned that ''*I use it because it was given to me''* (see figure 6). One of them said that it was given to them with the soya bean while the other one added that it [biofix inoculant] is the best one to use. The answer from the Busia farmer is split into two categories: "*it is the best one*" is listed as an *agronomic trait* because it suggests that it has a positive effect on the growth of the plant. While "*I use it because it is given*" is categorized as social environment because it says something about the perception of the farmer on how to deal with what is given to them.

Other answers in both regions are related to *agronomic traits.* They range from "*I want to increase soil fertility*" to "*I chose it because I want to diminish pests*". Some farmers specified their answer more, they mentioned for example; "*it helps in the germination of legumes*" or "*it reduces striga weed*".

5.3.3 Sympal

The reasons why farmers choose Sympal (a fertilizer blend specifically for legumes) is either because they recognize that it enhances the growth of the plant or because they say that they have learned it in the workshop. One farmer in Vihiga mentioned that "*it was the fertilizer available*" but did not explain why it is important to use it or why she choose it. This season, there were other fertilizers available to buy with the voucher, but they are not chosen by this farmer. Therefore it can be assumed that there were *agronomic traits* with this fertilizer which made it suitable to choose.

One farmer in Busia mentioned that she chose Sympal because "*plants need sunlight, and Sympal brings sunlight*" (see figure 6). From an agronomic perspective, or rational logic, the answer seems not to make sense. Sympal contains phosphorus (P) and potassium (K) and it is a fertilizer specific for legumes, they fix its own nitrogen (N) and therefore there is no need add it to fertilizer used for legumes. There is no sunlight included in the ingredients of Sympal. However, one of the scientists involved in the project, recalls that in the workshops there has been a discussion on specific intercropping configurations. This is important for legumes to get enough sunlight, especially when the maize is well fertilized, and in the past seasons this has challenged some farmers. Therefore it is assumed that this answer is a mix up between these two 'issues'. Since the farmer assigns this specific trait to Sympal it is listed as an *agronomic trait*.

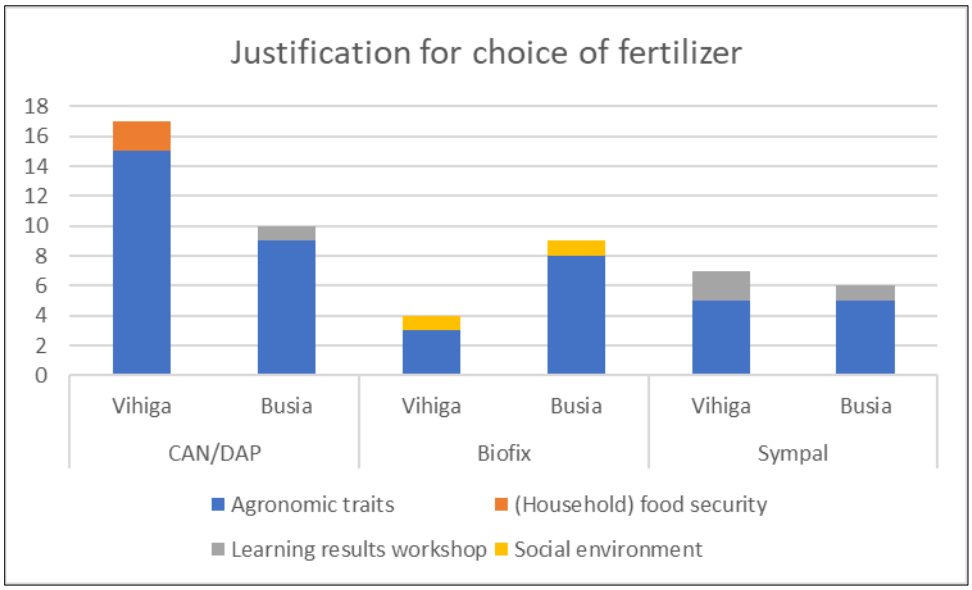

Figure 6: Justification for fertilizer choice of farmers in Vihiga (n=13) and Busia (n=12) for seeds they chose to buy with the voucher in LR2018, more than 1 answer per farmer was possible.

5.4 Underlying motivations in fertilizer choice

There is one category in which there were no answers given by farmers in relation to the motivation of the choice for fertilizer (see table 9), namely *experimenting*. It could be considered an opportunity to experiment for farmers who do not use fertilizer because they do not have to make a financial investment. However, since there are more given reasons which are related to agronomic traits or other outputs, it can be assumed that there is knowledge on the benefits of using fertilizer and thus not a new product which 'needs' experimenting to be better understood.

In Vihiga the importance of motivations underlying the choice is related to two main reasons; *earning cash for specific goals* and *food (security HH)* while in Busia there is more emphasis on *agronomic traits* (see table 11). This can be explained by seeing choices in a certain chain; once someone improved the soil fertility, the harvest will increase, and it will be easier to reach food security. However, it remains interesting that the narrative is different in Vihiga than in Busia.

*Table 11: Underlying motivation of the choice for specific fertilizer chosen by famers in Vihiga (n=13) and Busia (n=12) (comparison between counties).**

Why is this important to you?		
	Vihiga	*Busia*
Invest in African bank	**1**	
Pay school fees, medical bills and/or household items	**11**	**3**
Give good feeling or motivates	**4**	**4**
Food (security HH)	**11**	**6**
Cultural environment	**2**	**1**
Experimenting		
Agronomic traits		**13**
Managing external risks		**1**
Earning money from farming	**1**	**4**
Total	**30**	**32**

**) 1 or more answers per farmer was possible*

5.4.1 CAN & DAP

In Vihiga most explanations of the reasons for the choice of CAN & DAP, maize fertilizer, are related to *earning cash for specific reasons* or *food* (*security HH)* (see table 10). There was one farmer whom mentioned specifically that it is food for the kids. Next to these categories, there are two farmers whom mentioned that [good yields] gives them a good feeling or that it is motivating to continue farming. One farmer mentioned that ''*it is good to share* [available food]'' while another one mentioned that ''[sufficient yield] *prevents me from stealing*". Both reasons are the perception the farmers have (believe/know in the framework) on the reality and are categorized as *cultural environment*.

In Busia there is a clear high distribution on different answers, only *happy there is food for the children* is mentioned twice. All other answers are given a single time. Most (seven out of 13) are related to agronomic traits, ranging from "*I want good harvest"* to "*there is P needed for early development"*. One farmer mentioned that CAN & DAP gives bigger grains and thus fills the maize bags faster. Since this is a trait of a specific variety, it is categorized as *agronomic trait.* Same goes for the rent of a machine; the reasoning of the farmer is that with bigger grains, there is no need to rent a machine for shelling the maize. According to the farmer, the bigger grains are a result from using the CAN & DAP and thus it is categorized as an *agronomic trait*.

One farmer mentioned that it is important [to use CAN & DAP] because otherwise the maize will spoil. Spoiling of harvest is a risk and by using CAN & DAP the farmer tries to manage this risk. There was only one farmer in Busia who reasoned that using CAN & DAP is important because it enables the farmer to *earn money with farming*. The line of reasoning was that she wants to keep the business going.

5.4.2 Biofix inoculant

To the question why the justification to the choice is important, the answers of most farmers in Vihiga were related to food security (see table 10). Either for the family or to share with relatives. Some farmers mentioned that "there is stress when *there is no food*" and "*people sleep hungry when there is no food*". Two others mentioned that they want to earn money for specific goals like hospital bills or that it is motivating to have good harvests.

The answers in Busia had a somewhat different focus. Farmers there mentioned that their choice is important because "*I want to have surplus*" or "*to increase yields*". This assumes that there is a focus on the *agronomic traits* which are linked to the fertilizer. However, it should be considered that when this is seen in a chain of choices, it can lead to higher yields and thus result in (household) food security and selling surplus.

Give insight in the rational and the aspirations of farmers. One farmer mentioned that she gets bigger grains from the crops if she is using fertilizer. This results in her saving time when there are visitors. The bigger grains are an *agronomic trait* to the use of fertilizer.

There were two farmers who had a focus on *earning money from farming* (see table 10) but both in a different way. The first farmer explained that it is important to him that his children can go to school for them to find a job eventually. With the money that he earns, he wants to pay the school fees and therefore his answer is categorized as *cash for specific goals.* The other farmer mentioned that it is important to keep the business going, because one cannot solely depend on income from one job. This answer is categorized as *earning money from farming*. Here it is clearly shown that both farmers want to earn money, but their narrative is rather different.

5.4.3 Sympal

The question why the mentioned justification to choose this input is important, brought up many different answers. In Vihiga one farmer mentioned it is important because "*I was taught*". This listed as *cultural environment.*

In Busia one farmer mentioned "*I want to reach maximum profit*". This shows that the farmer is focused on running her farm as a business and want to get the best out of it. Without a doubt she *earns money with farming.* One other farmer mentioned that it is important because she wants to see that the crops do well, she wants them to perform well. This answer is listed as an *agronomic trait* since she is considering the performance of the plant. However, this leaves out whether it makes the farmer happy or motivates her to continue farming i.e. something which has been mentioned by other farmers.

*Table 12: Underlying motivations in the choice of fertilizer for famers in Vihiga (n=13) and Busia (n=12) (comparison between fertilizers)**

Why is this important to you?			
	CAN & DAP	*Biofix*	*Sympal*
Invest in African bank			**1**
Pay school fees, medical bills and/or household items	**10**	**2**	**2**
Give good feeling or motivates	**2**	**4**	**2**
Food (security HH)	**6**	**7**	**4**
Cultural environment	**2**		**2**
Agronomic traits	**7**	**3**	
Managing external risks	**1**		
Earning money from farming	**1**	**1**	**3**
Total	**29**	**17**	**17**

**) 1 or more answers per farmer was possible*

5.5 Justification for the choice of dairy farming inputs

There is a dichotomy in the reasons why the farmers chose these inputs. The first category of reasons is related to the management of the resources. While the second one is related directly to the household (see also figure 7). Within both counties, reasons related to farm management are by far the main reason to choose for dairy farming inputs.

Between dairy meal (DM) and dairy others (DO), there is a difference by the distribution of reasons: for DO there are more farmers who chose the input because of *farm management* reasons than for DM. This can be explained by a rational; the included items are more related to the management of the farm than to the immediate increase in milk production which the household can benefit from, either in terms of money or in terms of milk. However, it was never mentioned that the justification for these inputs is related to earning money while involved scientists argue that dairy cows can serve a huge financial benefit for the farmers.

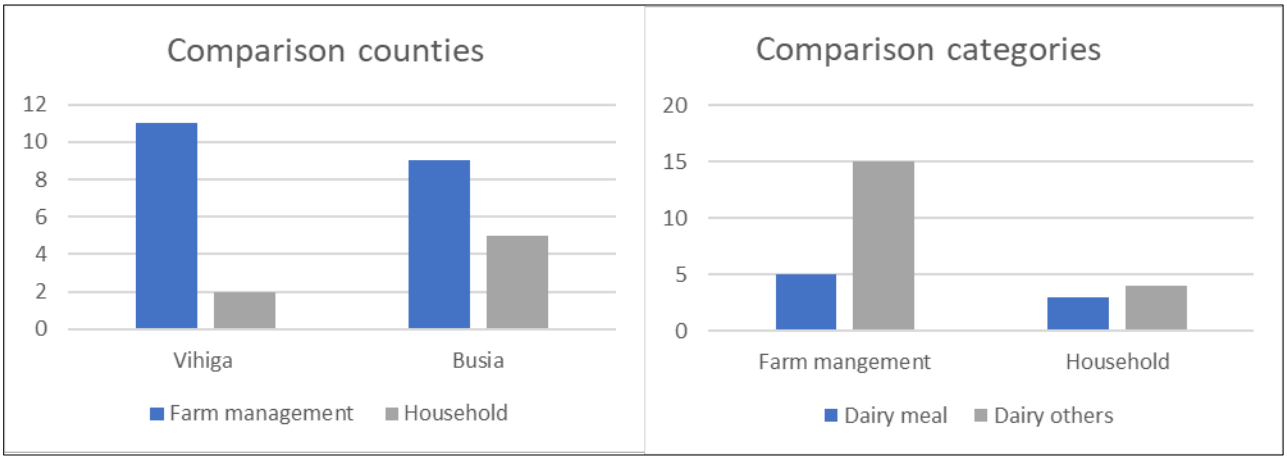

Figure 7: Justification of choice for dairy farming inputs for farmers in Vihiga (n=12) and Busia (n=13), answers per county (left) and answers per category (right), 1 or more answers per farmer was possible.

5.5.1 Dairy meal

One farmer mentioned that she chose dairy meal because it makes the cow look healthy. That is important to her because it makes her feel good and proud. Other answers in this category are mainly related to the improvement of the performance of the cow in terms of increase milk production or increase of manure.

5.5.2 Dairy others

In Vihiga one of the farmers mentioned that he learned in the workshop how to make a shed with the manure. Therefore, he chose the manure sheet (DO) to keep the manure and use it for building. In Vihiga there were only two farmers whom choose for dairy farming inputs because of reasons related to the household. One farmer explained: "*I want to use it as cooking fuel*" (Calliandra seedlings), while the other mentioned the increase of milk production as the reason why she chose it. In Busia five out of 14 answers are related to choosing the input because of *household reasons*. Two farmers in this county mentioned the use of Calliandra for firewood and one building a house. The reasons related to *farm management*, in both counties, are to increase the milk production, feed the animal, and the storage of manure (manure sheet), among others.

5.6 Underlying motivations in dairy farming inputs choice

Choosing for dairy farming inputs is mainly important to farmers because of reasons related to farm management or the food supply for the household. In the categories *fertilizer* and *seeds*, there was a clear part of the answers related to *earning money from farming*, while within this category, there is only a very small number of farmers who use these inputs to earn money from farming (see figure 8). Respectively three out of 17 in Vihiga and four out of 13 in Busia. However, this does not mean that choosing dairy farming inputs cannot enable a farmer to increase their income. For example, when a farmer increases the milk production, there is still an opportunity to either sell the surplus for cash or use within the household, replacing the need of buying milk.

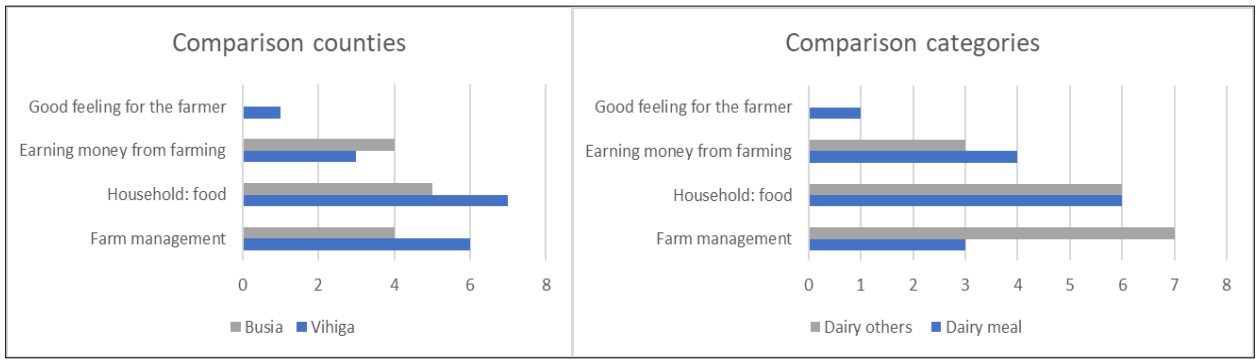

Figure 8: Underlying motivations in the choice of dairy farming inputs for Vihiga (n=12) and Busia (n=13), comparison per county (left) and per category (right), more than 1 answer per farmer possible.

5.6.1 Dairy meal

In Vihiga one farmer mentioned "*it is important to use dairy meal because I want to build a house*". At first this might seem odd, but she explained that the cow will give more milk, which she can sell for cash or exchange for labor. Therefore, the choice for DM is serving the aspirations of the household. Three farmers in Vihiga mentioned their preference for the use of sugar in their tea and the importance of drinking tea. A farmer mentioned "*without tea, one feels dull and it is thus important live an active life*".

Another farmer mentioned "*I like to eat ugali with sour milk*", in other words it is securing her food preferences. One farmer gave an answer which is not related to the farm or household directly. She stated that she chose dairy meal because it makes her cow healthy, and explained that is important to her because "*it makes me feel proud*". This is categorized as a *good feeling for the farmer*.

5.6.2 Dairy others

Within seeds and fertilizer, there is a category specific for items a farmer can buy with cash. Within DO, there was a specific comment for treatment for the cow. Here it is categorized as *farm management* because it is an investment in the farm. In *household food* there is are two different kind of answers given: either it is to eat, or it is for cash.

Chapter 6 Discussion & conclusion

This research aimed to contribute to the understanding of decisions made in farm management by investigating the underlying motivations of choices for inputs among smallholder farmers in western Kenya. Understanding *why* farmers make certain choices, presumably leads to insight in the reasons *why* farmers adopt, or do not adopt, new agricultural technologies (e.g. seed systems, fertilizers, microcredit). Participating farmers were interviewed according to laddering technique-protocol, resulting in a *functional justification* and *underlying motivations* for the choices they made. The interviewed farmers are participating in a PhD project which gave them a US$100,- voucher per season which could be spend on selected farming inputs (see *Chapter 2 Background*). Every season, farmers had the opportunity to participate in a co-learning cycle which enabled them to reflect on their choices, share experiences with scientists, and gain advice, both from fellow farmers and involved scientists. In this research, some answers from farmers reflected their learning, for example when the *functional justification* to their choice was described as '*I learned in the workshop that it is important'* (see *Chapter 5.3.3 Sympal*).

6.1 Methodology

Laddering techniques, as used in consumers studies, are expected to lead to a personal value (i.e. 'poultry manure – absorb excess water – higher margin – meet family needs - happiness' (Okello et al., 2014)). Within this research it was not always possible to reach this personal value because farmers said not to know the answer to the question they were asked. This might be modesty which is related to culture, or an underlying feeling that the 'right' answer might give a chance on gaining participation in a project or receiving inputs for the farm, as a result from previous NGO intervention in the area (see *Chapter 3 Farmers livelihood in context*). Though the answers did not always result in a personal value as such, it is assumed that the last answer which is given, still gives insight in the *underlying motivation* for the choice farmers made.

6.2 Functional justification

In general there were not many significant differences in the *functional justification* for the choice of either seeds, fertilizer or dairy farming inputs. In the justification for choosing maize seeds, the categories *food security* and *agronomic traits* were mentioned most often. In Vihiga the *functional justification* for the choice of maize seed is related to *agronomic traits* whereas the majority of the farmers in Busia mentioned reasons related to *food security.* In the aggregate for all seeds, including choices for bean seeds, ground nut seed, soya bean seed, and sorghum seed, the same difference was observed.

An explanation to this difference could be a difference in narrative: one can mention she wants more yields, but what is left out is that she wants more yields to accomplish food security. In this case, the functional justification is categorized as *agronomic traits* while the underlying motivation is categorized as *food security*. While another farmer might have mentioned that it is food as the *functional justification*. Both farmers have food security on their mind, but they explain themselves in a different way and their answers are respectively categorized as *agronomic traits* and *food security*. It is important to understand this difference in narrative because it gives insight in what is on top of the mind of

farmers when they make choices: farmers might have the same *functional justification* but put it in different words. Observing this difference might be a result of the fact that farming area for farmers in Vihiga is smaller compared to farming area for Busia. This enables farmer in Busia to have more focus on their farm as a business, while farmers in Vihiga struggle, and thus focus, more on reaching food security.

Most of results seems to point out that farmers are not driven by intuitive reasons for choosing soya bean and groundnut, but have clear *functional justifications* which were related to the *earning money from farming*, i.e. the price they can get on the market. However, it should be mentioned that, like other seeds, they are most often chosen for their *agronomic traits* and because of *food security* reasons. This is in line with what the involved researchers think as an economical choice: farming opportunities to earn money which is sufficient to spend on food and gain cash.

At the start of the project, most farmers did not use Biofix and Sympal, two fertilizers respectively for soya bean, and for soya bean, groundnut and beans, and oftentimes they said they did not know how to use it. Only in Sympal, there were four farmers who mentioned that they chose it either because it was told to them or it was learned in the workshop. In the *justification* for Biofix, there were two farmers who mentioned that they chose it because it was given to them. All six *functional justifications* might make one question to which extend the farmers will continue choosing these inputs when they are no longer made available by the project.

6.3 Underlying motivation

However, looking into the *underlying motivation* for the choices along all inputs, there is a dichotomy between answers which fit in a farm management optimization narrative and answers which are focused on aspirations outside the farm. Though these answers might be based on the same *justification*. Taking a closer look (complete diagram can be found in annex 2) at the justification and motivation for choosing CAN & DAP in Vihiga (figure 9), it shows that four farmers chose the input because they want their plants to grow well or get high yields. While part of the motivation is related to a good feeling, the other part is related to earning money for specific goals. In other words, the part half is related to the aspirations of the farmer whilst the other part is following a business-oriented narrative. The same thing can be observed in answers which were given for beans in Vihiga (see annex 4). While farmers justify their answer by saying that these seeds do well, their motivation is that they love beans on the one hand while it is food and surplus will support to earn money.

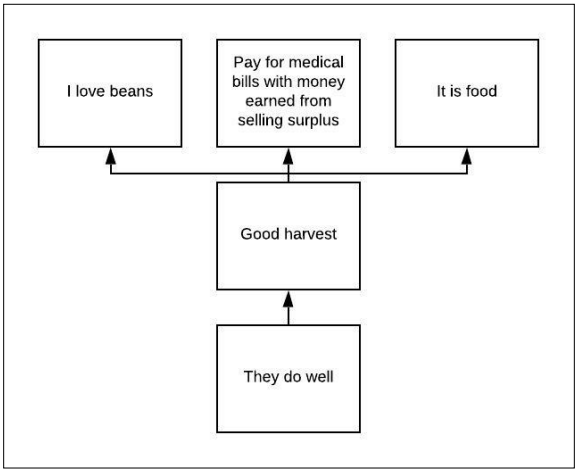

Figure 9: selection of justification and motivation for the choice of bean seed in Vihiga county.

So while this research focused on the justification and motivation to understand the choices farmers make, it would be advisable to understand the complete narrative one is using. Unraveling the layers show that an economic narrative and the rule of thumb can be closely connected. Someone who is

saying that he is choosing a certain fertilizer might justify that by saying that it is important to let the plants grow well, while this has nothing to do with the money one can earn but everything with the motivation it gives the farmer to continue farming.

6.4 Results in theoretical perspective

The World Development Report 2015 (World Bank, 2014) distinguishes three different variables which influence decisions: (i) people make quick automatic decisions operating within a 'satisficing' rather than optimizing model, (ii) social norms influence choices, and (iii) historical learnings and cultural beliefs shape perspective.

The answers in the justification partially underlines variable (i) from the World Bank framework which indicates that people make automatic choices (World Bank, 2014). A few times farmers gave answers like '*I was told to use it*' or '*I chose it because it was given*', this might be understood as the satisficing choice. It is a convenient choice to make, rather than a choice which is focusing on the optimization of farm management or other aspirations or dreams a farmer might have. However, diving deeper into the motivation of these justifications, it still results in values such as '*it is motivating*' or that it enables farmers to make money from farming. Stating that farmers for a satisficing choice might suggest that it is a shallow, short term choice but also farmers who make a satisficing choice, still aim to achieve aspirations though they might not follow simple narratives on economic optimization. Understanding the underlying motivations thus takes a more sophisticated method to get to the core. The laddering technique used in this research has shown that it has the potential in unraveling the layers of a decision for farm management choices is made because it gives way to tap into farmers rule of thumb in making decisions.

The other indicators the World Development *Mind, Society, and Behavior* (2014) report mentions, are also seen in the research. Social norms (ii) and cultural believes (iii) like *it is important to share* and *ugali is a staple food in Kenya* are mentioned as the underlying motivation for choices. Especially in the underlying motivations about dairy farming inputs, several farmers mentioned that it was important to drink tea with milk and sugar, which can be considered a social norm or cultural believe. As goes for the way farmers underline the importance of eating ugali; it is not only Kenyans staple food but especially in this region of high importance. It is believed that ugali will make people strong. However, this shows that there are *underlying motivations* based on historical learning and cultural believes, which shaped perspective and therefore influenced the choices farmers make.

This thinking is also in line with Shah et al. (2012) who reasons that people who experience scarcity in something, tend to focus more on what they are short of. This can be illustrated with an example: when there is enough money, simple expenses like groceries, come and go. They do not need ones attention. Though when money is scarce, it becomes harder to make certain expenses like those groceries. Instead of mundane, they seem to be more pressing and thus attract more attention. In the case of smallholder farmers in this area, there is a history of periods of food insecurity, times when people had to go sleeping hungry. It can be assumed that the mindset of people has changed because of previous scarcity and thus people are more focused on the shortest way to food security.

However, it cannot be left out, that some farmers were focused on making money from farming. For example in the justification for choice of bean seed, the Busia famers seem to be more focused on *earning money from farming* compared to farmers in Vihiga. Busia farmers gave answers like: I chose

this because ‘‘*the costs for farming need to be covered* or *this crop sells for a higher price compared to e.g. maize*’’. In Vihiga there were only four farmers who gave answers like that compared to 13 in Busia, that is four (4) times as much. It has to be mentioned that there are less off-farm options for income and the area which is used by farmers is often bigger than in Vihiga. The latter enables farmers to reach food self-sufficiency on part of the land and use the remaining to earn money. As seen in the answers, often farmers prioritize their household food security over making money from farming. This indicates that farmers who were participating in the project, and thus received a voucher and co-learning trajectory, were enabled to start changing their mindset and focus on a broader picture.

This diversity in narrative in decision-making processes is also acknowledged by Okello et al. (2013). Using the same laddering techniques, they demonstrate that the decision making in the use of fertilizer is complex and consists of many considerations. Some of these considerations, just as in this research, are related to social objectives, while others follow an optimization for farm management narrative.

6.5 Concluding remarks

When participating in this project, farmers go for an economic optimum decision in input choices for farm management. This is shown in e.g. the application of fertilizer and reflected in the motivation for intensification, e.g. farmers make choices aiming to get well growing plants and surplus which can be sold. Both with the *underlying motivation* to reach food security and/or earning money to allocate to personal needs such as paying for school fees, and/or buying household items, and/or paying medical bills.

Two limitations of this research should be mentioned. First of all, the project the farmers are participating in, is rather enabling. They are participating in a project which gave them the opportunity to spend money which they did not have, did not have to be raised by them nor does it have to be returned. Though it is not clear how their choices are influenced by this fact, it can be assumed that there would be less or other opportunities without the voucher.

Second, both Vihiga and Busia received quite some donor support in the past because there are opportunities for intensification and optimization of agricultural production. As discussed in *Chapter 3 Farmers’ livelihood in context,* it has to be considered that interviewees respond differently when they think more than just an interview is at stake, i.e. they can get benefits from giving the ‘right’ answer.

Last but not least, if there would be a way to optimization of agricultural production in these counties, it could be related to the market opportunities for i.e. groundnut. Involved scientists suggested that there are opportunities for farmers to sell their groundnut for a good price, e.g. one which enables them to earn money which is sufficient to buy food and have some extra for other expenses. It does not have to do with optimization in the management of the farm, but rather with an opportunity to make farming a business. However, it remains a question whether that is the ambition farmers have or that the ugali remains on top of their mind.

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Annex 1 Choices per farmer LR2018

1.1 Vihiga

	Maize	Beans	Soya bean	Groundnut	Sorghum	CAN&DAP	Biofix	Sympal	Dairy meal	Dairy others
1V014	X			X		X		X		
1V101	X	X	X			X	X	X		
1V102	X	X				X				X
1V103	X	X	X	X		X	X	X		
2V007	X	X	X	X		X		X	X	X
2V008	X	X	X	X		X	X			
2V009	X	X	X	X		X	X	X	X	
2V012	X			X		X		X	X	X
2V100	X	X	X	X		X	X	X		X
2V202	X	X				X				X
3V016	X	X	X			X	X	X	X	
3V018	X	X		X		X				X
3V201	X		X			X	X	X	X	X
Total	**13**	**10**	**8**	**8**	**0***	**13**	**7**	**9**	**5**	**7**

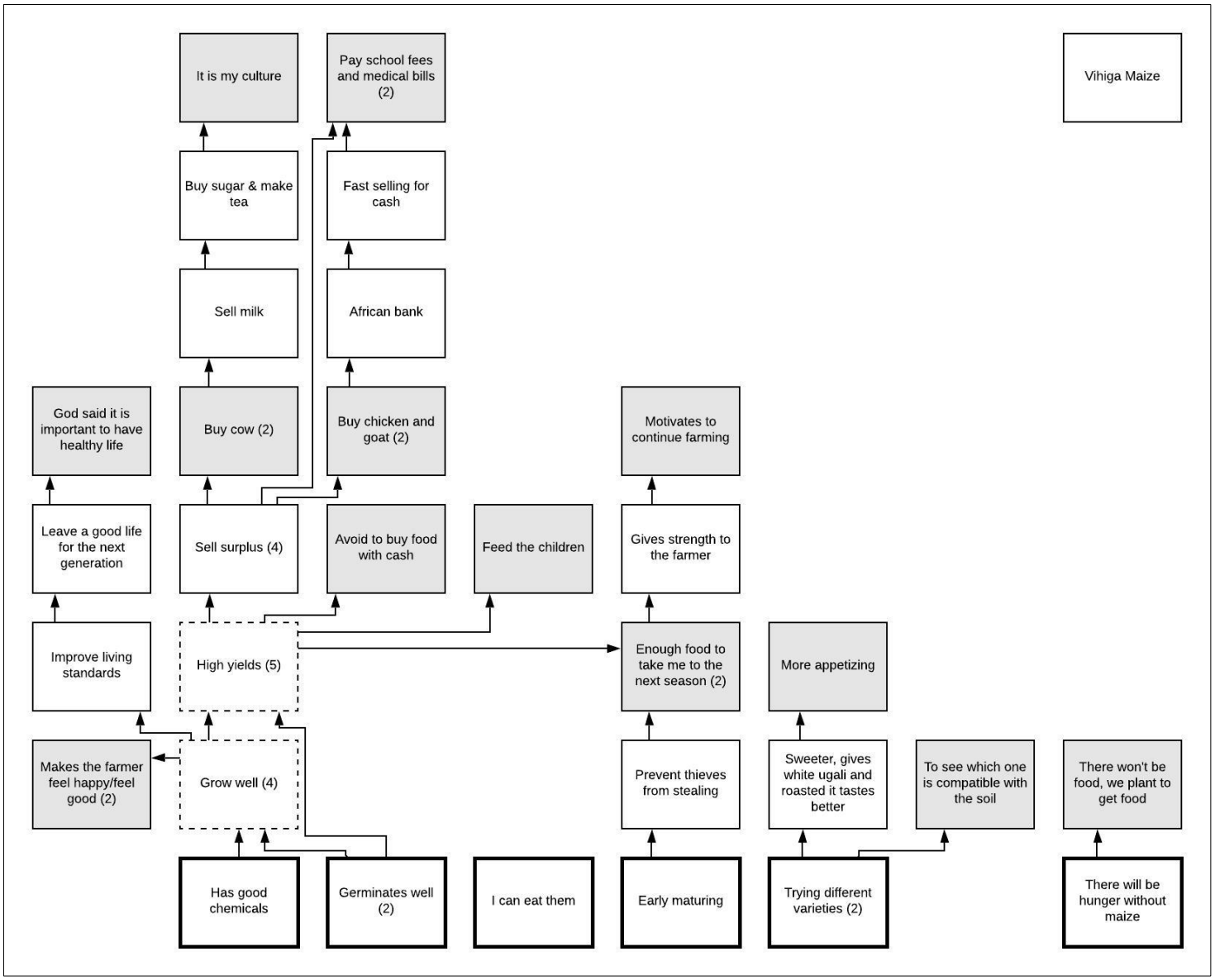
*) Farmers in Vihiga did not chose for sorghum; it was not included in the voucher because the area is not suitable for the growth of sorghum, see also *chapter 2 Background*.

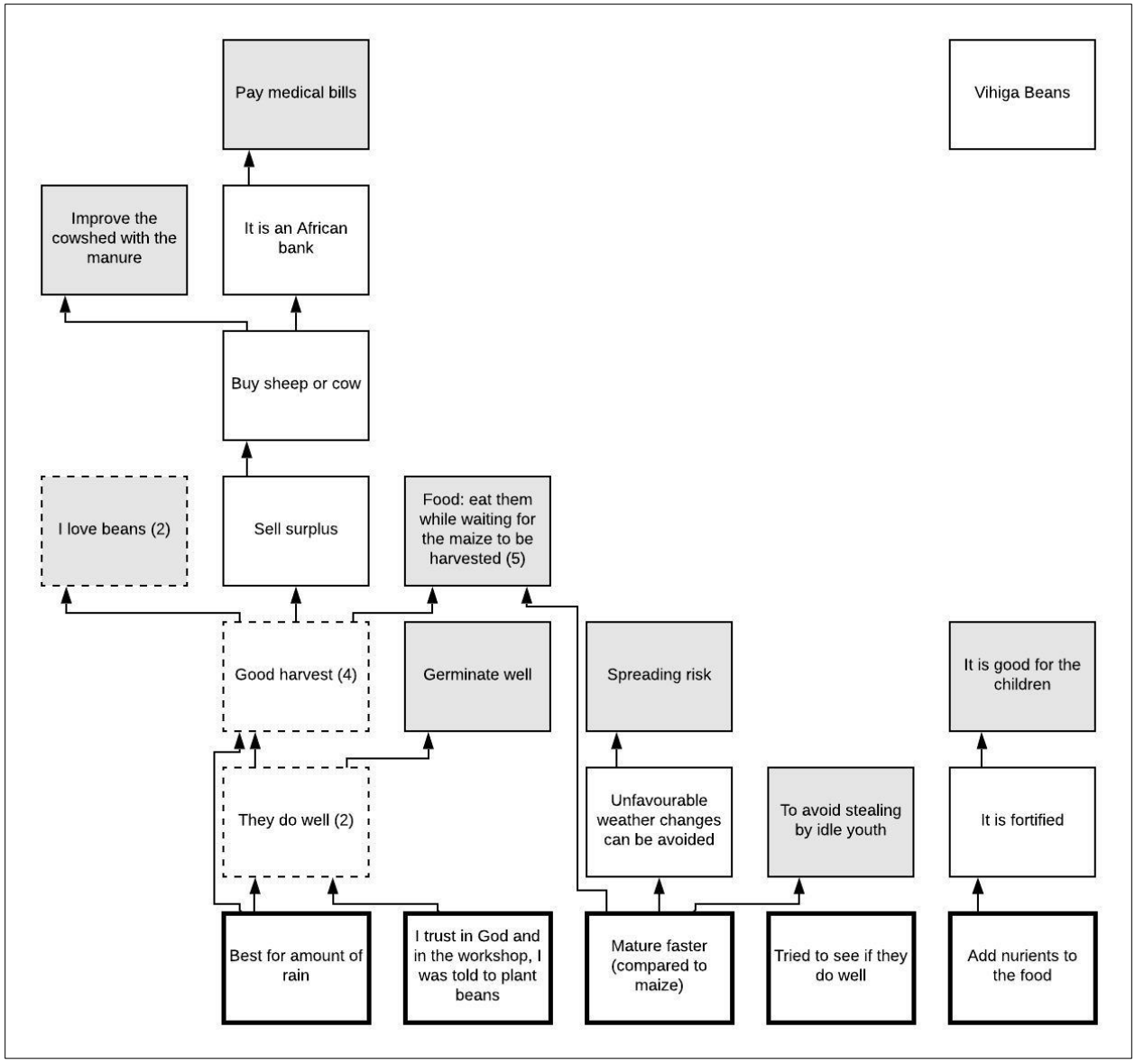
1.2 Busia

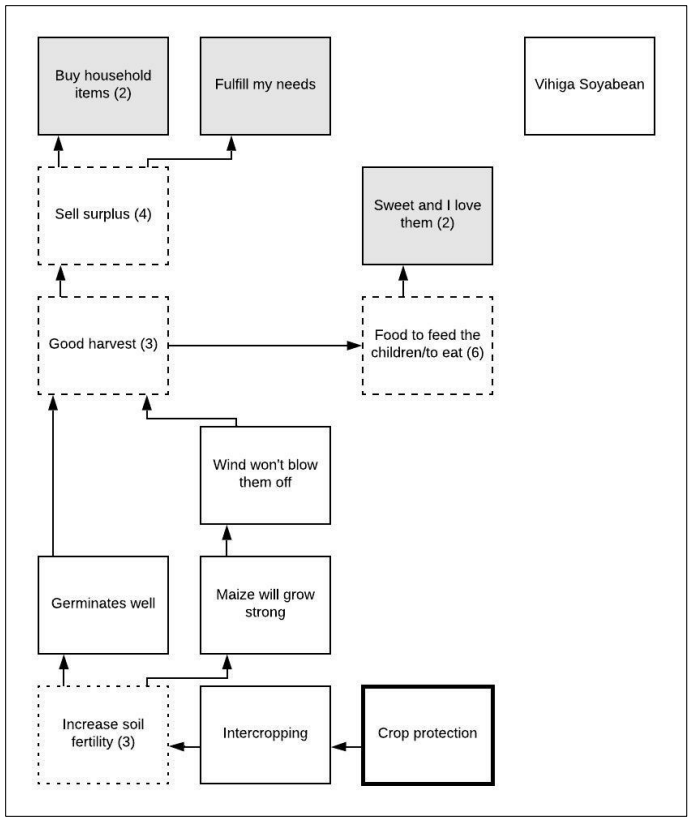
	Maize	Beans	Soya bean	Groundnut	Sorghum	CAN&DAP	Biofix	Sympal	Dairy meal	Dairy others
1B107	X	X	X		X	X	X	X		X
1B108	X	X	X			X	X	X		
1B109	X		X	X	X	X	X			X
1B110	X	X		X	X	X		X		
2B007	X	X		X		X	X			
2B100	X					X	X	X		X
2B111	X	X	X	X		X	X	X		
2B112	X	X				X	X		X	
3B001	X	X		X		X	X			
3B005		X		X			X		X	X
3B006	X					X		X	X	X
3B010				X		X		X		
Total	**10**	**8**	**4**	**7**	**3**	**11**	**9**	**7**	**3**	**5**

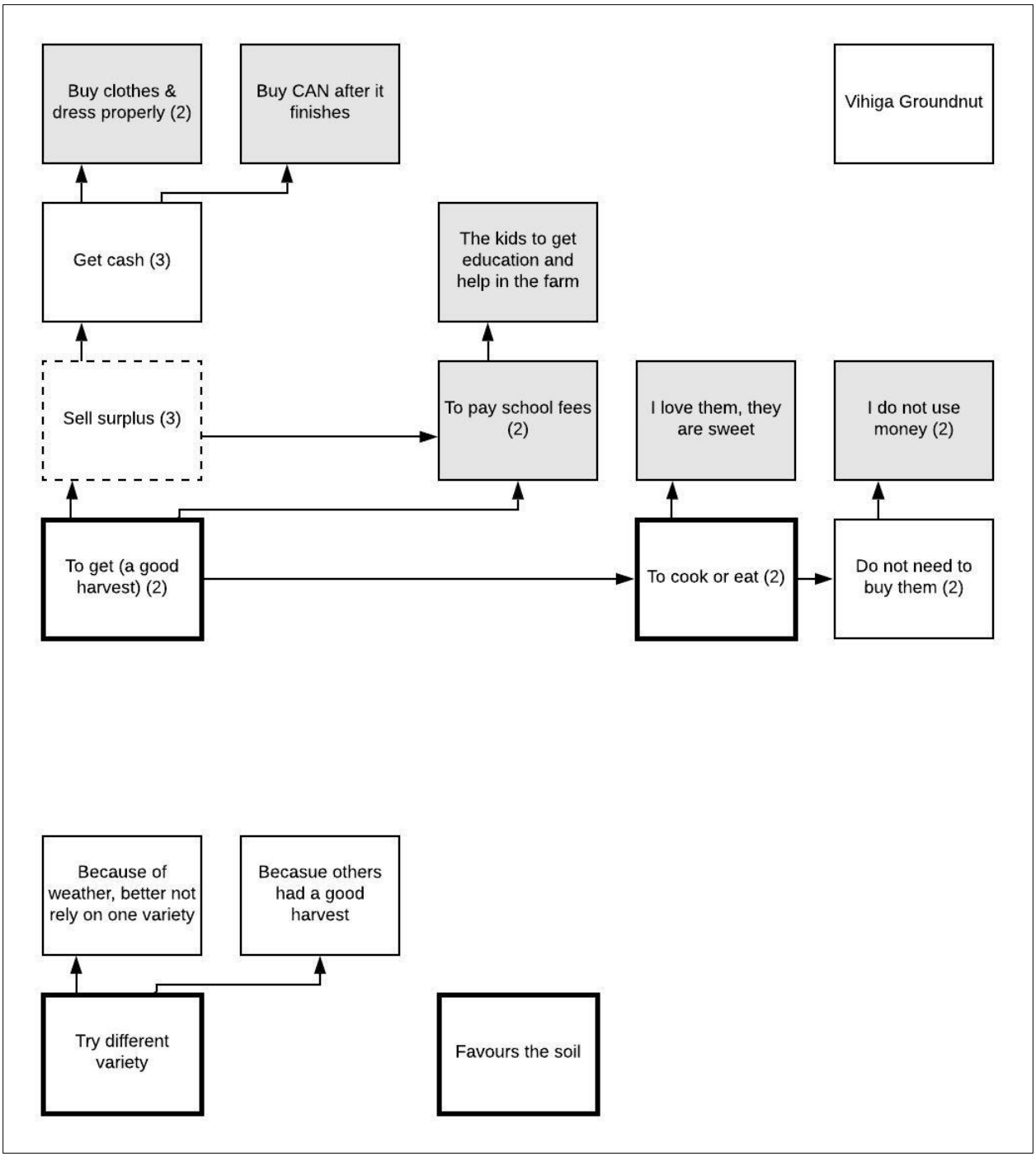
Annex 2 Diagrams justification and motivation per input

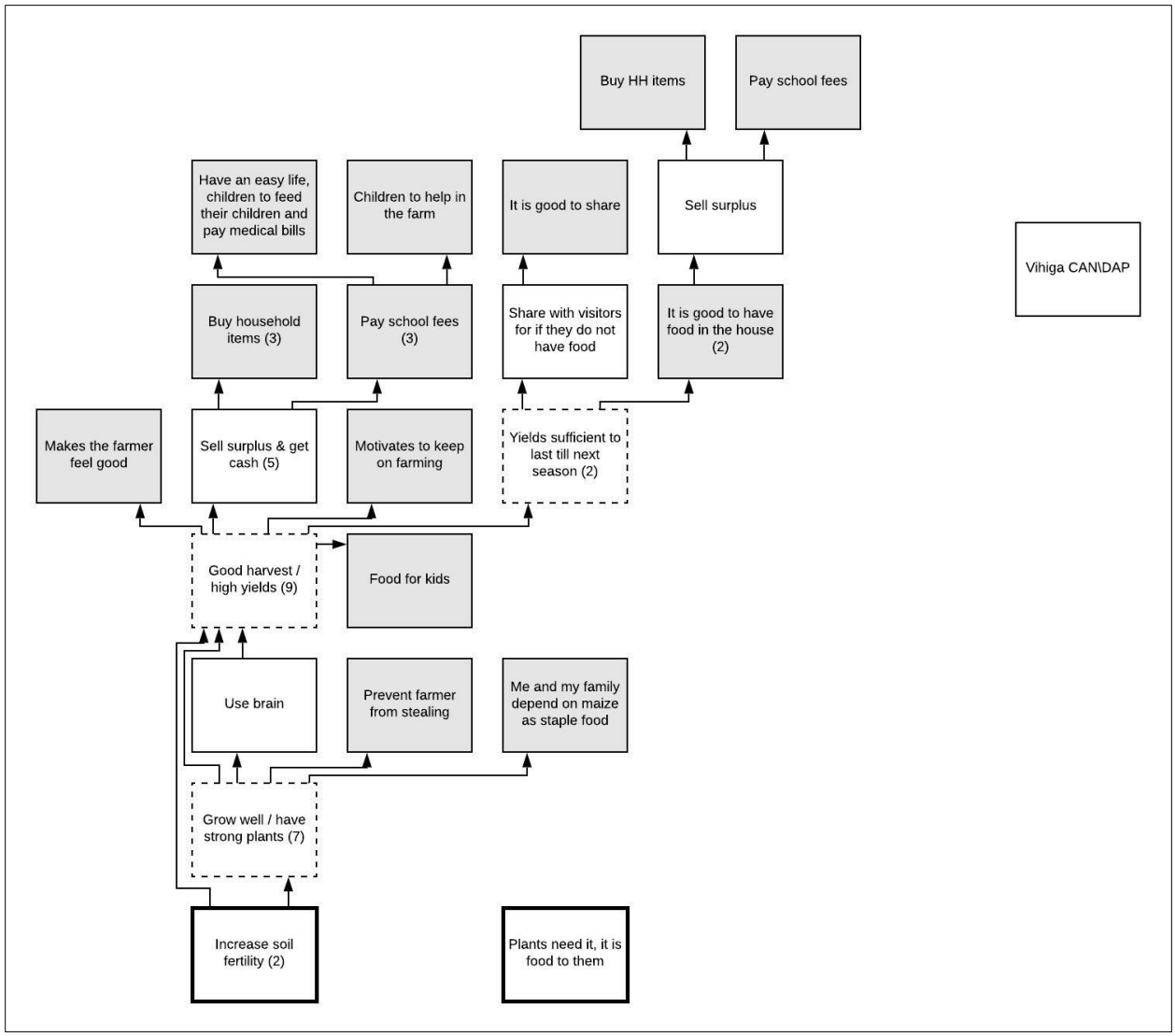
2.1 Vihiga

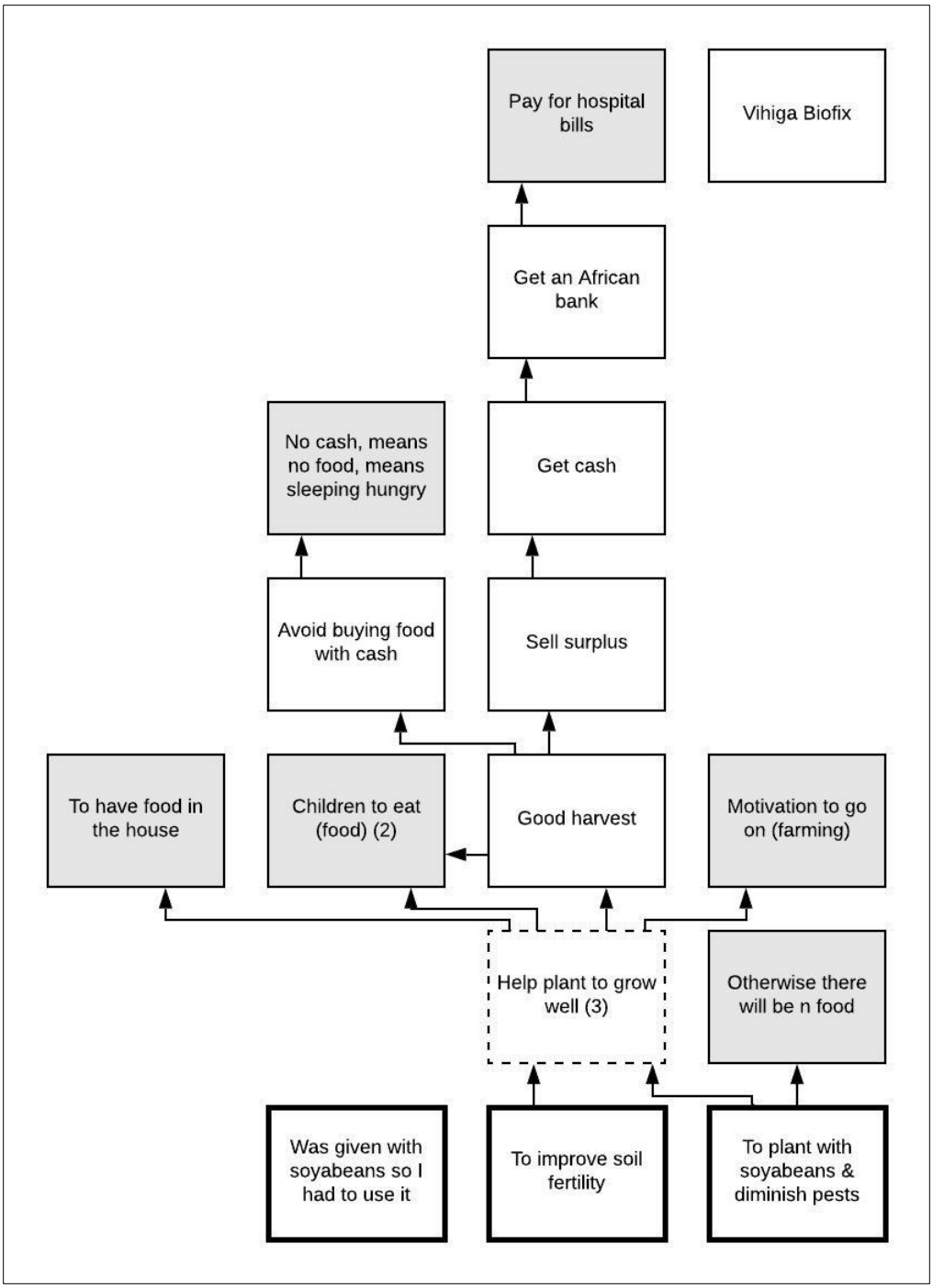


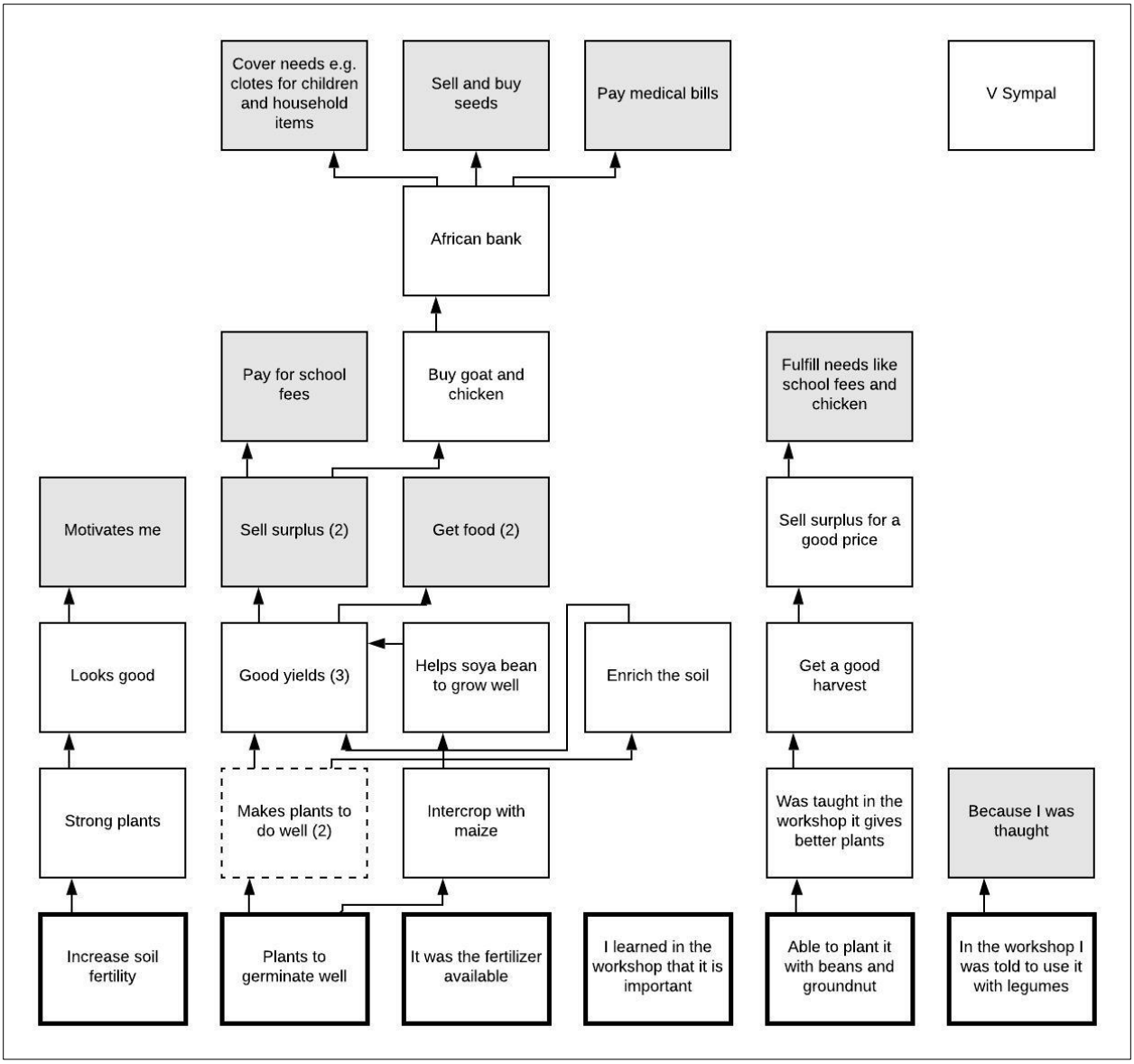

Pay medical bills
Vihiga Beans
Improve the cowshed with the manure
It is an African bank
Buy sheep or cow
I love beans (2)
Sell surplus
Food: eat them while waiting for the maize to be harvested (5)
Good harvest (4)
Germinate well
Spreading risk
It is good for the children
They do well (2)
Unfavourable weather changes can be avoided
To avoid stealing by idle youth
It is fortified
Best for amount of rain
I trust in God and in the workshop, I was told to plant beans
Mature faster (compared to maize)
Tried to see if they do well
Add nurients to the food

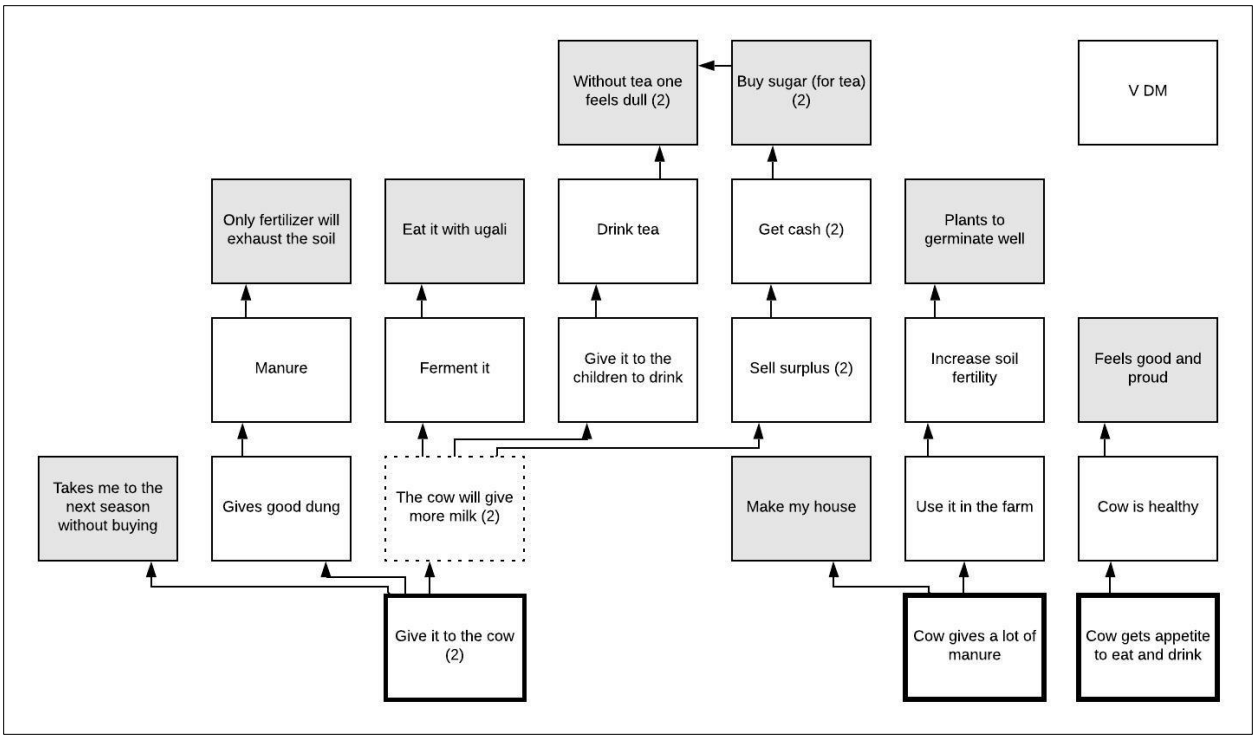

Buy household items (2)
Fulfill my needs
Vihiga Soyabean
Sell surplus (4)
Sweet and I love them (2)
Good harvest (3)
Food to feed the children/to eat (6)
Wind won't blow them off
Germinates well
Maize will grow strong
Increase soil fertility (3)
Intercropping
Crop protection

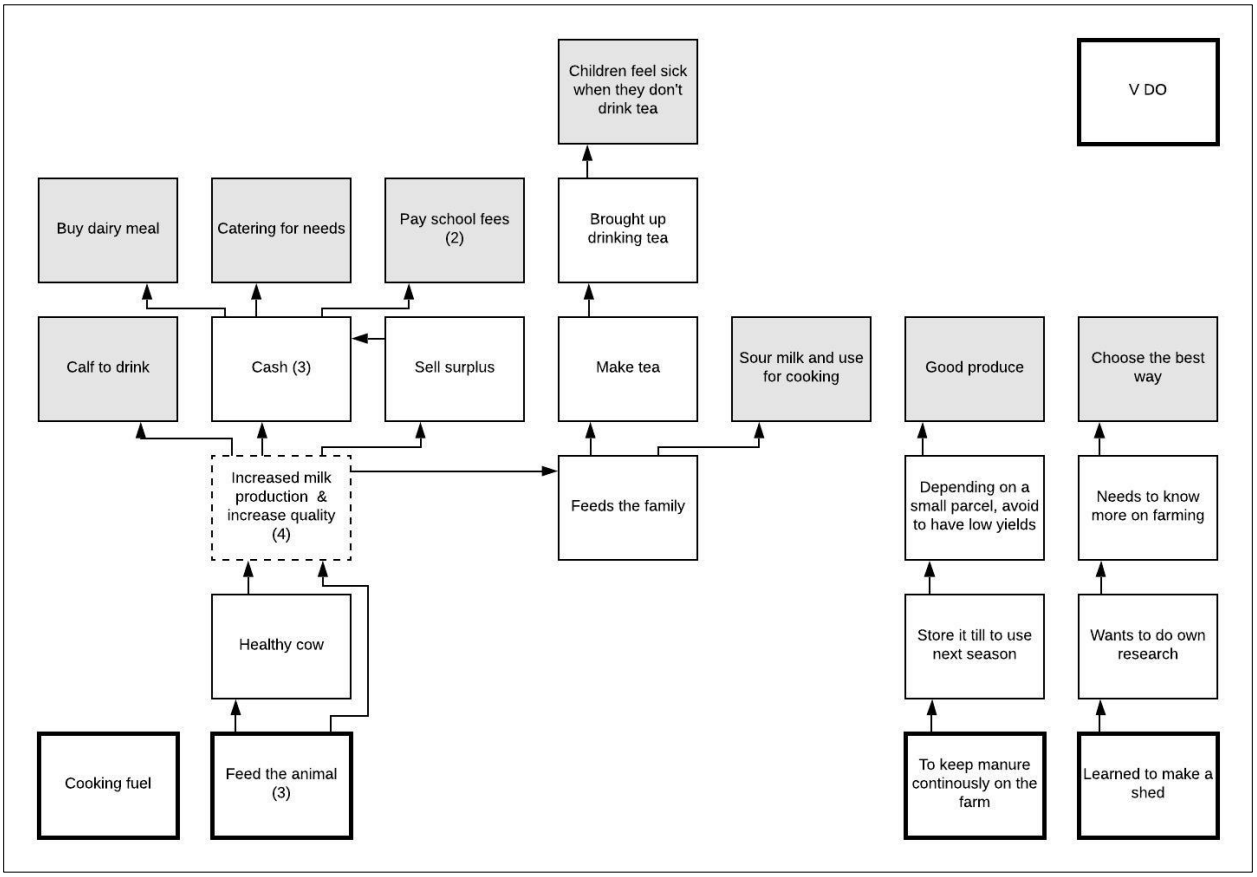

Buy clothes & dress properly (2)
Buy CAN after it finishes
Vihiga Groundnut
Get cash (3)
The kids to get education and help in the farm
Sell surplus (3)
To pay school fees (2)
I love them, they are sweet
I do not use money (2)
To get (a good harvest) (2)
To cook or eat (2)
Do not need to buy them (2)
Because of weather, better not rely on one variety
Becasue others had a good harvest
Try different variety
Favours the soil


Buy HH items
Pay school fees
Have an easy life, children to feed their children and pay medical bills
Children to help in the farm
It is good to share
Sell surplus
Vihiga CAN\DAP
Buy household items (3)
Pay school fees (3)
Share with visitors for if they do not have food
It is good to have food in the house (2)
Makes the farmer feel good
Sell surplus & get cash (5)
Motivates to keep on farming
Yields sufficient to last till next season (2)
Good harvest / high yields (9)
Food for kids
Use brain
Prevent farmer from stealing
Me and my family depend on maize as staple food
Grow well / have strong plants (7)
Increase soil fertility (2)
Plants need it, it is food to them

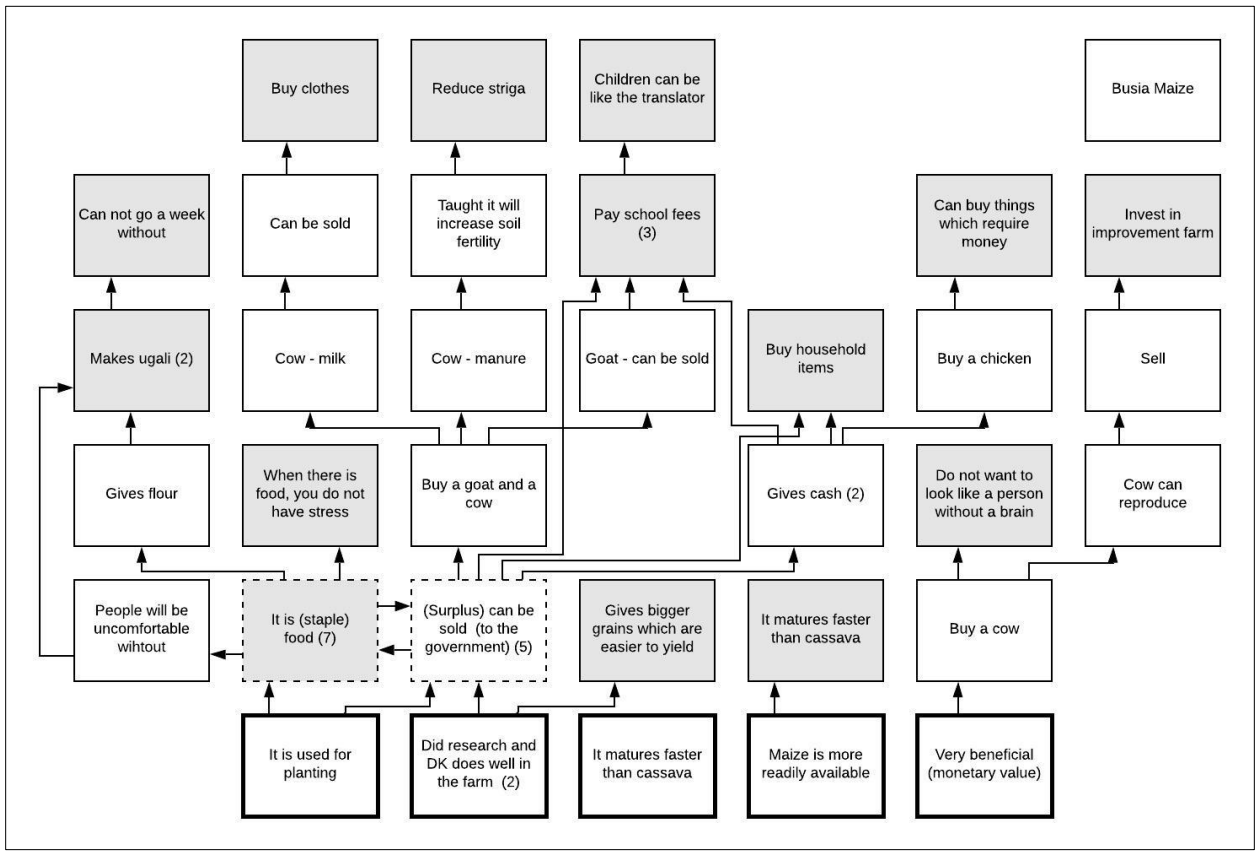

Pay for hospital bills
Vihiga Biofix
Get an African bank
No cash, means no food, means sleeping hungry
Get cash
Avoid buying food with cash
Sell surplus
To have food in the house
Children to eat (food) (2)
Good harvest
Motivation to go on (farming)
Help plant to grow well (3)
Otherwise there will be n food
Was given with soyabeans so I had to use it
To improve soil fertility
To plant with soyabeans & diminish pests

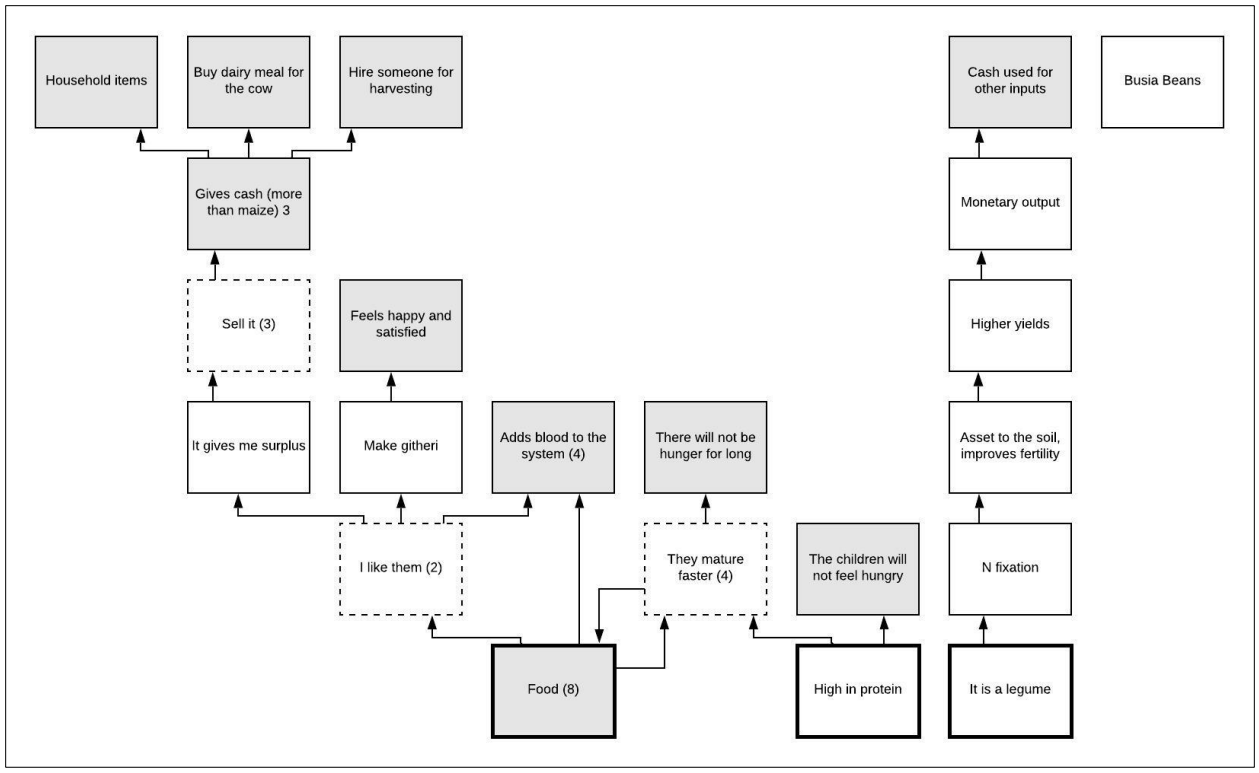

Cover needs e.g. clotes for children and household items
Sell and buy seeds
Pay medical bills
V Sympal
African bank
Pay for school fees
Buy goat and chicken
Fulfill needs like school fees and chicken
Motivates me
Sell surplus (2)
Get food (2)
Sell surplus for a good price
Looks good
Good yields (3)
Helps soya bean to grow well
Enrich the soil
Get a good harvest
Strong plants
Makes plants to do well (2)
Intercrop with maize
Was taught in the workshop it gives better plants
Because I was thaught
Increase soil fertility
Plants to germinate well
It was the fertilizer available
I learned in the workshop that it is important
Able to plant it with beans and groundnut
In the workshop I was told to use it with legumes

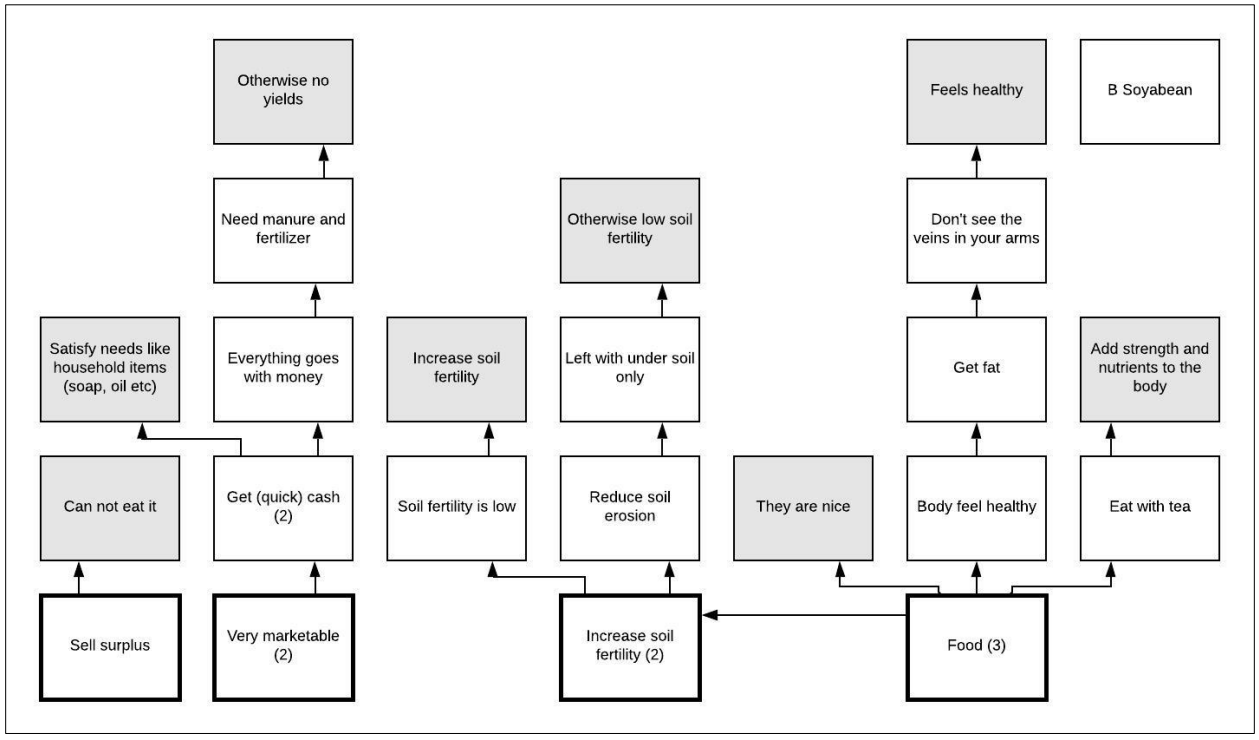

Without tea one feels dull (2)
Buy sugar (for tea) (2)
V DM
Only fertilizer will exhaust the soil
Eat it with ugali
Drink tea
Get cash (2)
Plants to germinate well
Manure
Ferment it
Give it to the children to drink
Sell surplus (2)
Increase soil fertility
Feels good and proud
Takes me to the next season without buying
Gives good dung
The cow will give more milk (2)
Make my house
Use it in the farm
Cow is healthy
Give it to the cow (2)
Cow gives a lot of manure
Cow gets appetite to eat and drink

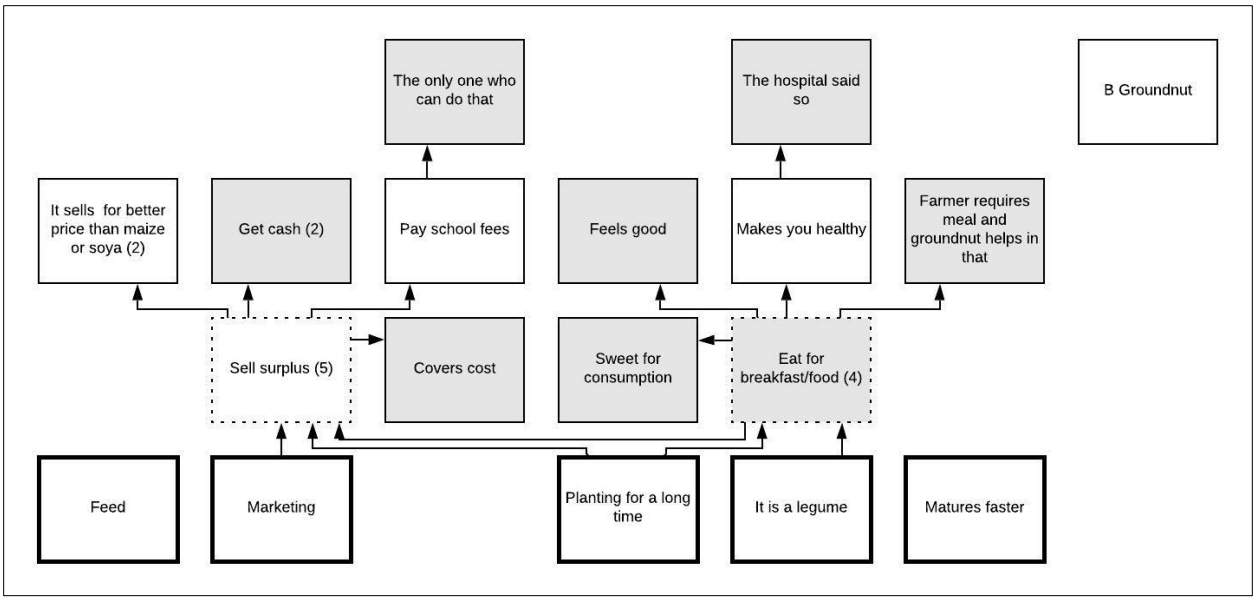

Children feel sick when they don't drink tea
V DO
Buy dairy meal
Catering for needs
Pay school fees (2)
Brought up drinking tea
Calf to drink
Cash (3)
Sell surplus
Make tea
Sour milk and use for cooking
Good produce
Choose the best way
Increased milk production & increase quality (4)
Feeds the family
Depending on a small parcel, avoid to have low yields
Needs to know more on farming
Healthy cow
Store it till to use next season
Wants to do own research
Cooking fuel
Feed the animal (3)
To keep manure continously on the farm
Learned to make a shed

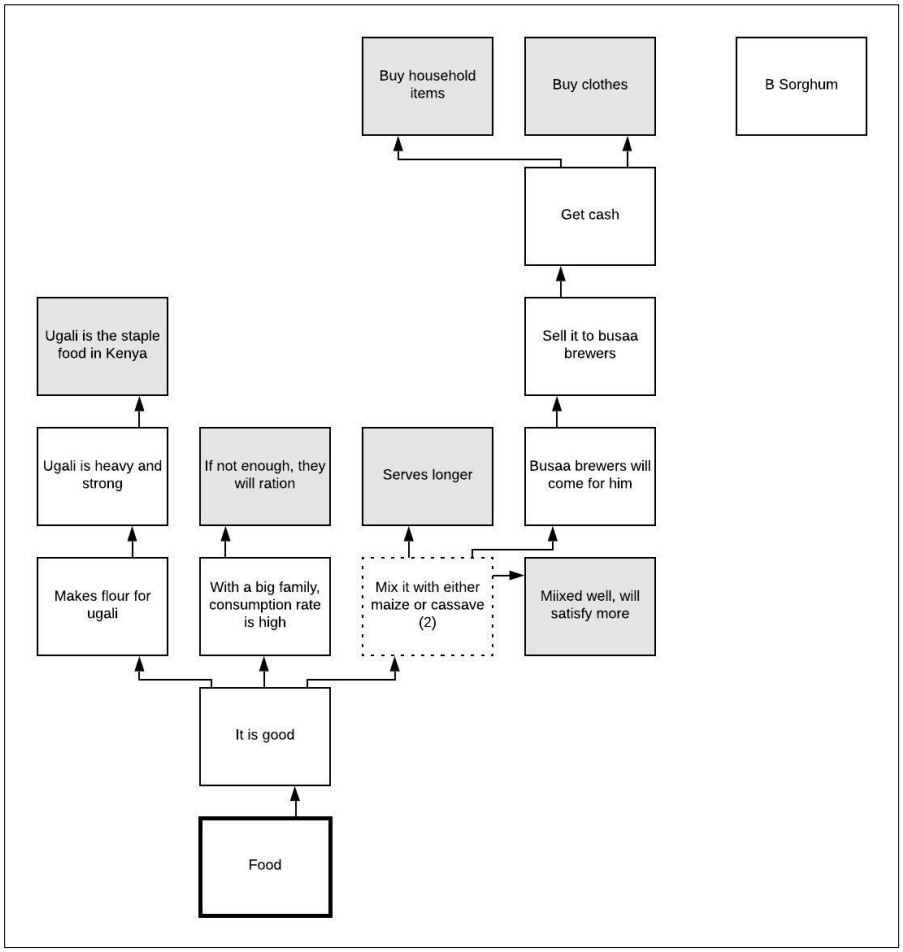
2.2 Busia

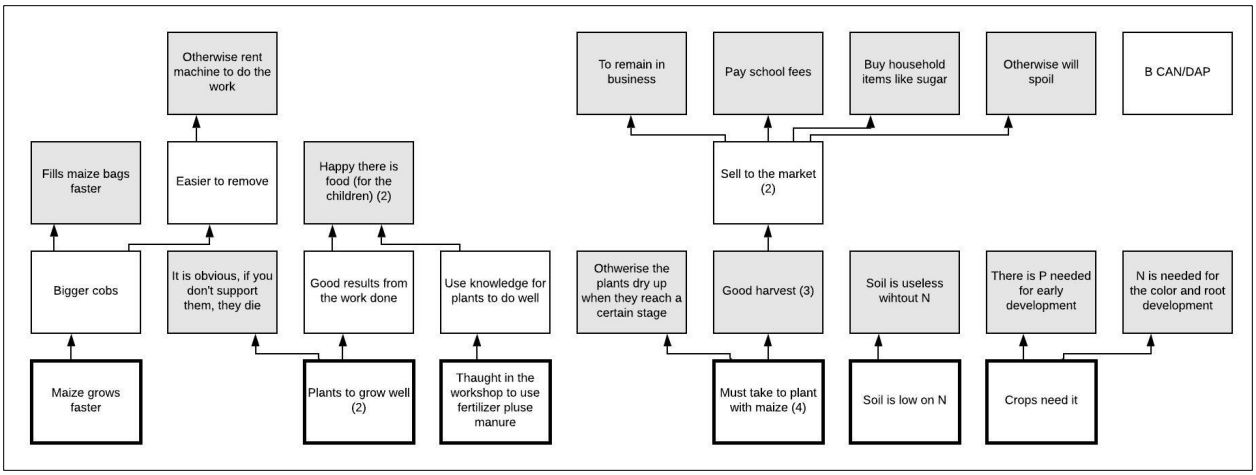

Buy clothes
Reduce striga
Children can be like the translator
Busia Maize
Can not go a week without
Can be sold
Taught it will increase soil fertility
Pay school fees (3)
Can buy things which require money
Invest in improvement farm
Makes ugali (2)
Cow - milk
Cow - manure
Goat - can be sold
Buy household items
Buy a chicken
Sell
Gives flour
When there is food, you do not have stress
Buy a goat and a cow
Gives cash (2)
Do not want to look like a person without a brain
Cow can reproduce
People will be uncomfortable wihtout
It is (staple) food (7)
(Surplus) can be sold (to the government) (5)
Gives bigger grains which are easier to yield
It matures faster than cassava
Buy a cow
It is used for planting
Did research and DK does well in the farm (2)
It matures faster than cassava
Maize is more readily available
Very beneficial (monetary value)

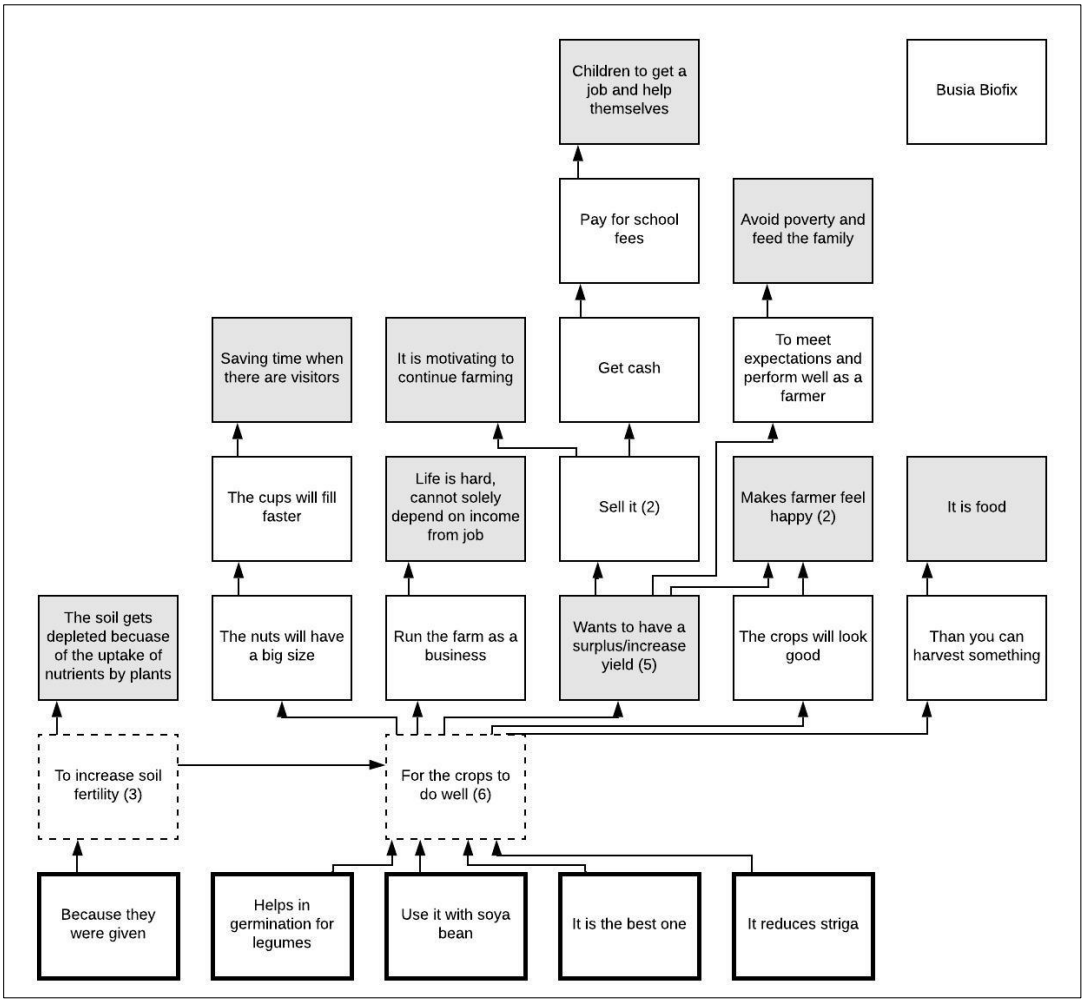

Household items
Buy dairy meal for the cow
Hire someone for harvesting
Gives cash (more than maize) 3
Sell it (3)
Feels happy and satisfied
It gives me surplus
Make githeri
Adds blood to the system (4)
There will not be hunger for long
I like them (2)
They mature faster (4)
The children will not feel hungry
Food (8)
High in protein
Cash used for other inputs
Busia Beans
Monetary output
Higher yields
Asset to the soil, improves fertility
N fixation
It is a legume

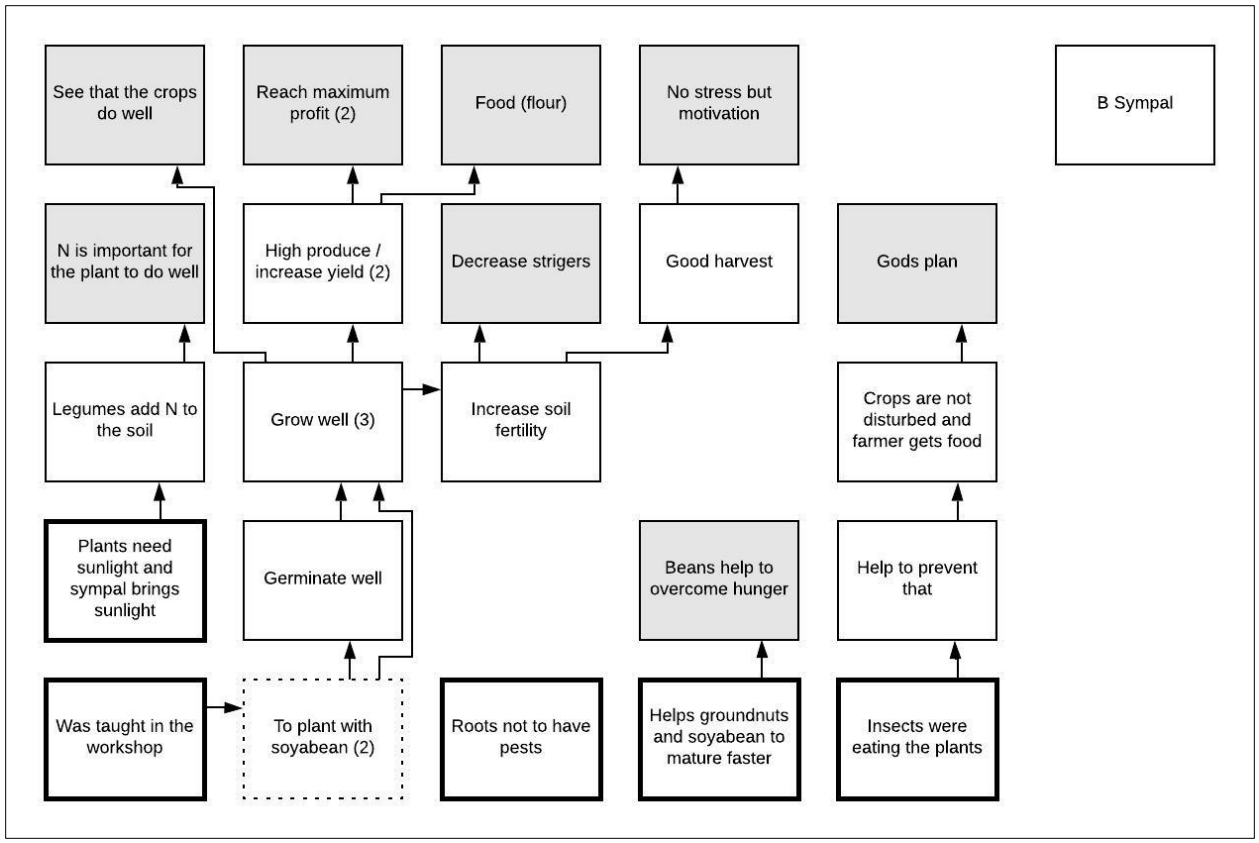

Otherwise no yields
Need manure and fertilizer
Satisfy needs like household items (soap, oil etc)
Everything goes with money
Can not eat it
Get (quick) cash (2)
Sell surplus
Very marketable (2)
Increase soil fertility
Soil fertility is low
Otherwise low soil fertility
Left with under soil only
Reduce soil erosion
Increase soil fertility (2)
They are nice
Feels healthy
B Soyabean
Don't see the veins in your arms
Get fat
Add strength and nutrients to the body
Body feel healthy
Eat with tea
Food (3)

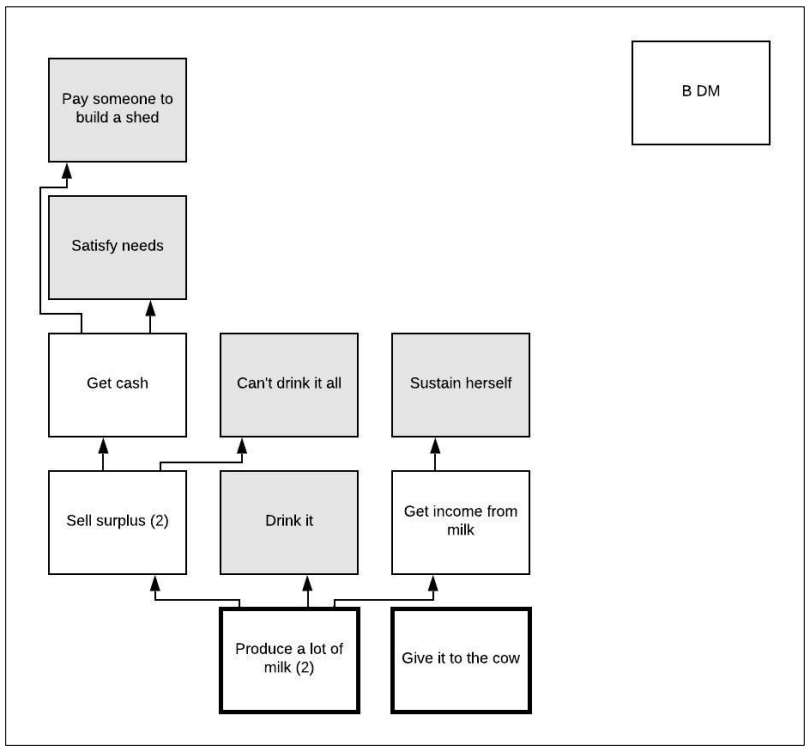

The only one who can do that
The hospital said so
B Groundnut
It sells for better price than maize or soya (2)
Get cash (2)
Pay school fees
Feels good
Makes you healthy
Farmer requires meal and groundnut helps in that
Sell surplus (5)
Covers cost
Sweet for consumption
Eat for breakfast/food (4)
Feed
Marketing
Planting for a long time
It is a legume
Matures faster


Buy household items
Buy clothes
B Sorghum
Get cash
Ugali is the staple food in Kenya
Sell it to busaa brewers
Ugali is heavy and strong
If not enough, they will ration
Serves longer
Busaa brewers will come for him
Makes flour for ugali
With a big family, consumption rate is high
Mix it with either maize or cassave (2)
Miixed well, will satisfy more
It is good
Food


Otherwise rent machine to do the work
To remain in business
Pay school fees
Buy household items like sugar
Otherwise will spoil
B CAN/DAP
Fills maize bags faster
Easier to remove
Happy there is food (for the children) (2)
Sell to the market (2)
Bigger cobs
It is obvious, if you don't support them, they die
Good results from the work done
Use knowledge for plants to do well
Othwerise the plants dry up when they reach a certain stage
Good harvest (3)
Soil is useless wihtout N
There is P needed for early development
N is needed for the color and root development
Maize grows faster
Plants to grow well (2)
Thaught in the workshop to use fertilizer pluse manure
Must take to plant with maize (4)
Soil is low on N
Crops need it


Children to get a job and help themselves
Busia Biofix
Pay for school fees
Avoid poverty and feed the family
Saving time when there are visitors
It is motivating to continue farming
Get cash
To meet expectations and perform well as a farmer
The cups will fill faster
Life is hard, cannot solely depend on income from job
Sell it (2)
Makes farmer feel happy (2)
It is food
The soil gets depleted becuase of the uptake of nutrients by plants
The nuts will have a big size
Run the farm as a business
Wants to have a surplus/increase yield (5)
The crops will look good
Than you can harvest something
To increase soil fertility (3)
For the crops to do well (6)
Because they were given
Helps in germination for legumes
Use it with soya bean
It is the best one
It reduces striga


See that the crops do well
Reach maximum profit (2)
Food (flour)
No stress but motivation
B Sympal
N is important for the plant to do well
High produce / increase yield (2)
Decrease strigers
Good harvest
Gods plan
Legumes add N to the soil
Grow well (3)
Increase soil fertility
Crops are not disturbed and farmer gets food
Plants need sunlight and sympal brings sunlight
Germinate well
Beans help to overcome hunger
Help to prevent that
Was taught in the workshop
To plant with soyabean (2)
Roots not to have pests
Helps groundnuts and soyabean to mature faster
Insects were eating the plants


B DM
Pay someone to build a shed
Satisfy needs
Get cash
Can't drink it all
Sustain herself
Sell surplus (2)
Drink it
Get income from milk
Produce a lot of milk (2)
Give it to the cow

Annex 3 Specific answers & categorization per input

3.1 Seeds

Maize

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Germinate & grow well	Agronomic traits	**4**	It is food	(Household) food security	**5**
High yields	Agronomic traits	**3**	Did research and DK does well in the farm	Experimenting	**2**
Trying different varieties	Experimenting	**2**	Surplus can be sold	Earning money from farming	**3**
Early maturing	Agronomic traits	**1**	It matures faster than cassava	Agronomic traits	**1**
Has good chemicals	Agronomic traits	**1**	Very beneficial (monetary value)	Earning money from farming	**1**
I can eat them	(Household) food security	**1**	It is used for planting	Agronomic traits	**1**
There will be hunger without maize	(Household) food security	**1**			
		13			**13**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Buy cow, chicken and/or goat	Invest in African bank	**4**	It is food, or it makes ugali	Food (security HH)	**4**

Pay school fees and medical bills	Pay school fees, medical bills and/or household items	**2**	Pay school fees	Pay school fees, medical bills and/or household items	**3**
Makes the farmer feel happy/good	Give good feeling or motivates	**2**	Buy clothes, or household items, or other items which require cash	Pay school fees, medical bills and/or household items	**3**
Enough food to last till the next season	Food (security HH)	**2**	Reduce striga weed	Agronomic traits	**1**
God said it is important to have a healthy life	Believe in what is true	**1**	When there is food, you do not have stress	Food (security HH)	**1**
It is my culture	Believe in what is true	**1**	Gives bigger grains which are easier to yield	Agronomic traits	**1**
Avoid buying food with cash	Food (security HH)	**1**	It matures faster than cassava	Food (security HH)	**1**
Feed the children	Food (security HH)	**1**	Do not want to look like a person without a brain	Believe in what is true	**1**
Motivating to continue farming	Give good feeling or motivates	**1**			
More appetizing	Food (security HH)	**1**			
To see which one is compatible with the soil	Experimenting	**1**			
		17			15

Beans

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Good harvest	(Household) food security	**2**	Food	(Household) food security	**7**
They do well	Agronomic traits	**1**	They mature faster	Agronomic traits	**2**
I trust in God and in the workshop, I was told to plant beans	Learning results workshop	**1**	Sell it	Earning money from farming	**2**

Best for amount of rain	Agronomic traits	**1**	I like them	(Household) food security	**1**
Mature faster (compared to maize)	Agronomic traits	**1**	High in protein	(Household) food security	**1**
I love beans	(Household) food security	**1**	It is a legume	Agronomic traits	**1**
Add nutrients to the food	(Household) food security	**1**			
Tried to see if they do well	Experimenting	**1**			
		9			**14**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
It is food: eat them while waiting for the maize to be harvested	Food (security HH)	**5**	Adds blood to the system	Food (security HH)	**4**
I love beans	Food (security HH)	**1**	Gives cash (more than maize)	Earning money from farming	**3**
Germinate well	Agronomic traits	**1**	There will not hunger for long	Food (security HH)	**1**
Spread risk (of failing harvest)	Agronomic traits	**1**	Cash can be used for other inputs	Earning money from farming	**1**
To avoid stealing by idle youth	Managing external risks	**1**	The children will not feel hungry	Food (security HH)	**1**
It is good for the children	Food (security HH)	**1**	Food	Food (security HH)	**1**
Improve the cowshed with manure	Invest in African bank	**1**	Feels happy and satisfied (food)	Give good feeling or motivates	**1**
Pay medical bills	Pay school fees, medical bills and/or household items	**1**			
		12			**12**

Soya bean

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Increase soil fertility	Agronomic traits	**2**	Food	(Household) food security	**3**
Food	(Household) food security	**5**	Increase soil fertility	Agronomic traits	**2**
Sell surplus	Earning money from farming	**2**	Very marketable	Earning money from farming	**2**
Good harvest	Agronomic traits	**3**	Sell surplus	Earning money from farming	**1**
		12			**8**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Buy household items	Pay school fees, medical bills and/or household items	**2**	Cannot eat (the surplus)	Earning money from farming	**1**
Sweet and I love them	Food (security HH)	**2**	Satisfy needs like household items	Pay school fees, medical bills and/or household items	**1**
Fulfill my needs	Pay school fees, medical bills and/or household items	**1**	Increase soil fertility	Agronomic traits	**1**
			Otherwise no yields	Agronomic traits	**1**
			They are nice	Food (security HH)	**1**

			Feels healthy	Give good feeling or motivates	**1**
			Add strength and nutrients to the body	Food (security HH)	**1**
			Otherwise low soil fertility	Agronomic traits	**1**
		5			**8**

Groundnut

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Sell surplus	Earning money from farming	**2**	Food	(Household) food security	**2**
To cook or to eat	(Household) food security	**2**	Sell surplus	Earning money from farming	**2**
To get a good harvest	Agronomic traits	**2**	Feed	Agronomic traits	**1**
Favors the soil	Agronomic traits	**1**	Marketing	Earning money from farming	**1**
Try different varieties	Experimenting	**1**	Planting for a long time	Earning money from farming	**1**
			It is a legume	Agronomic traits	**1**
			Matures faster	Agronomic traits	**1**
		8			**9**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Buy clothes and dress properly	Pay school fees, medical bills and/or household items	**2**	Get cash	Earning money from farming	**2**
To pay school fees	Pay school fees, medical bills and/or household items	**2**	Food	Food (security HH)	**2**

I do not use money	Food (security HH)	**2**	It sells for better prices than maize	Earning money from farming	**2**
Buy CAN after it finishes	Pay school fees, medical bills and/or household items	**1**	The only one who can (pay school fees)	Pay school fees, medical bills and/or household items	**1**
I love them, they are sweet	Food (security HH)	**1**	Cover costs	Earning money from farming	**1**
Others had a good harvest	Managing external risks	**1**	Sweet for consumption	Food (security HH)	**1**
With weather better not rely on 1 variety	Agronomic traits	**1**	Feels good	Give good feeling or motivates	**1**
			The hospital said so (make you healthy)	Give good feeling or motivates	**1**
		10			**11**

Sorghum

Why did you choose for this input?

Busia		#
Answer	**Category**	
Food	(Household) food security	**1**
Mix it with either maize or cassava	(Household) food security	**1**

Why is this important to you?

Busia		#
Answer	**Category**	
Ugali is the stable food	Food (security HH)	**1**
If there is not enough food, need to ration	Food (security HH)	**1**
Serves longer	Food (security HH)	**1**
Mixed well, it will satisfy more	Food (security HH)	**1**

Buy household items	Pay school fees, medical bills and/or household items	**1**
Buy clothes	Pay school fees, medical bills and/or household items	**1**
		6

3.2 Fertilizer

CAN & DAP

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Plants to grow well/be strong	Agronomic traits	**6**	Must take to plant with maize	Agronomic traits	**4**
Good harvest/high yields	Agronomic traits	**6**	Plants to grow well	Agronomic traits	**2**
Yields to be sufficient to last till next season	(Household) food security	**2**	Maize grows faster	Agronomic traits	**1**
Increase soil fertility	Agronomic traits	**2**	Taught in the workshop to use fertilizer plus manure	Learning results workshop	**1**
Plants need it, it is food for them	Agronomic traits	**1**	Soil is low on N	Agronomic traits	**1**
			Crops need it	Agronomic traits	**1**
		17			**10**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Buy household items	Pay school fees, medical bills and/or household items	4	Happy there is food for the children	Food (security HH)	2

Pay school fees	Pay school fees, medical bills and/or household items	4	Good harvest	Agronomic traits	1
It is good to have food in the house	Food (security HH)	2	Fills maize bags faster	Agronomic traits	1
Makes the farmer feel good	Give good feeling or motivates	1	Otherwise rent machine to do the work	Managing external risks	1
Food for kids	Food (security HH)	1	Otherwise plants dry up when they reach a certain stage	Agronomic traits	1
Motivating to keep on farming	Give good feeling or motivates	1	To remain in business	Earning money from farming	1
Prevent farmer from stealing	Cultural environment	1	Pay school fees	Pay school fees, medical bills and/or household items	1
Me and my family depend on maize as staple food	Food (security HH)	1	Buy household items like sugar	Pay school fees, medical bills and/or household items	1
It is good to share	Cultural environment	1	Otherwise it will spoil (surplus)	Agronomic traits	1
			Soil is useless without N	Agronomic traits	1
			There is P needed for early development	Agronomic traits	1
			N is needed for the color and root development	Agronomic traits	1
		16			13

Biofix inoculant

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	

Was given with the soya beans so I had to use it	Social environment	**1**	To increase soil fertility	Agronomic traits	**2**
To improve soil fertility	Agronomic traits	**1**	For the crops to do well	Agronomic traits	**2**
To plant with soya beans and diminish pests	Agronomic traits	**1**	Use it with soya bean	Agronomic traits	**1**
Help plants to grow well	Agronomic traits	**1**	It is the best one	Agronomic traits	**1**
			It reduces striga	Agronomic traits	**1**
			Because it was given	Social environment	**1**
			Helps in the germination of legumes	Agronomic traits	**1**
		4			**9**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Children to eat (food)	Food (security HH)	**2**	Makes the farmer feel happy	Give good feeling or motivates	**2**
To have food in the house	Food (security HH)	**1**	Want to have a surplus/increase yield	Agronomic traits	**1**
No cash means no food, means sleeping hungry	Food (security HH)	**1**	The soil gets depleted because of the uptake of nutrients by plants	Agronomic traits	**1**
Otherwise there will be no food	Food (security HH)	**1**	Saving time when there are visitors	Agronomic traits	**1**
Motivation to go on farming	Give good feeling or motivates	**1**	It is motivating the farmer to continue farming	Give good feeling or motivates	**1**
Pay for hospital bills	Pay school fees, medical bills and/or household items	**1**	Children to get a job and help themselves (earn money to pay for school fees)	Pay school fees, medical bills and/or household items	**1**
			Avoid poverty and feed the family	Food (security HH)	**1**
			It is food	Food (security HH)	**1**
			Life is hard, cannot solely depend on the income from job	Earning money from farming	**1**

		7			**10**

Sympal

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Increase soil fertility	Agronomic traits	1	To plant with soya bean	Agronomic traits	1
Plants to germinate well	Agronomic traits	1	Was taught in the workshop	Learning results workshop	1
It was the fertilizer available	Agronomic traits	1	Roots not to have pests	Agronomic traits	1
I learned in the workshop that it is important	Learning results workshop	1	Helps groundnut and soya bean to mature faster	Agronomic traits	1
Able to plant it with beans and groundnut	Agronomic traits	1	Insects were eating the plants	Agronomic traits	1
In the workshop I was told to use it with legumes	Learning results workshop	1	Plants need sunlight and Sympal brings sunlight	Agronomic traits	1
Makes plants to do well	Agronomic traits	1			
		7			**6**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Get food	Food (security HH)	**2**	Reach maximum profit	Earning money from farming	**2**
Pay for school fees	Pay school fees, medical bills and/or household items	**1**	See that the crops do well	Agronomic traits	**1**
Sell surplus	Earning money from farming	**1**	N is important for the crops to do well	Agronomic traits	**1**

Motivates me	Give good feeling or motivates	**1**	Food (flour)	Food (security HH)	**1**
African bank	Invest in African bank	**1**	Decrease striga	Agronomic traits	**1**
Fulfill needs like school fees and chicken	Pay school fees, medical bills and/or household items	**1**	No stress but motivation	Give good feeling or motivates	**1**
fBecause I was taught	Cultural environment	**1**	Gods plan	Cultural environment	**1**
			Beans help to overcome hunger	Food (security HH)	**1**
		8			**9**

3.3 Dairy farming inputs

Dairy meal

Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Give it to the cow	Farm management	2	Give it to the cow	Farm management	1
Cow gets appetite to eat and drink	Farm management	1	Produce a lot of milk	Household	2
Cow gives a lot of manure	Farm management	1			
Cow will give more milk	Household	1			
		5			3

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Without tea, one feels dull	Household: food	2	Pay someone to build a shed	Farm management	1
Buy sugar for tea	Household: food	1	Satisfy needs	Earning money from farming	1
Eat it with ugali	Household: food	1	Can't drink it all	Earning money from farming	1
Only fertilizer will exhaust the soil	Farm management	1	Drink it	Household: food	1
Takes me to the next season without buying	Household: food	1	Sustain herself	Earning money from farming	1

Build a house	Earning money from farming	1			
Plants to germinate well	Farm management	1			
Farmer feels good and proud	Good feeling for the farmer	1			
		9			5

Dairy others

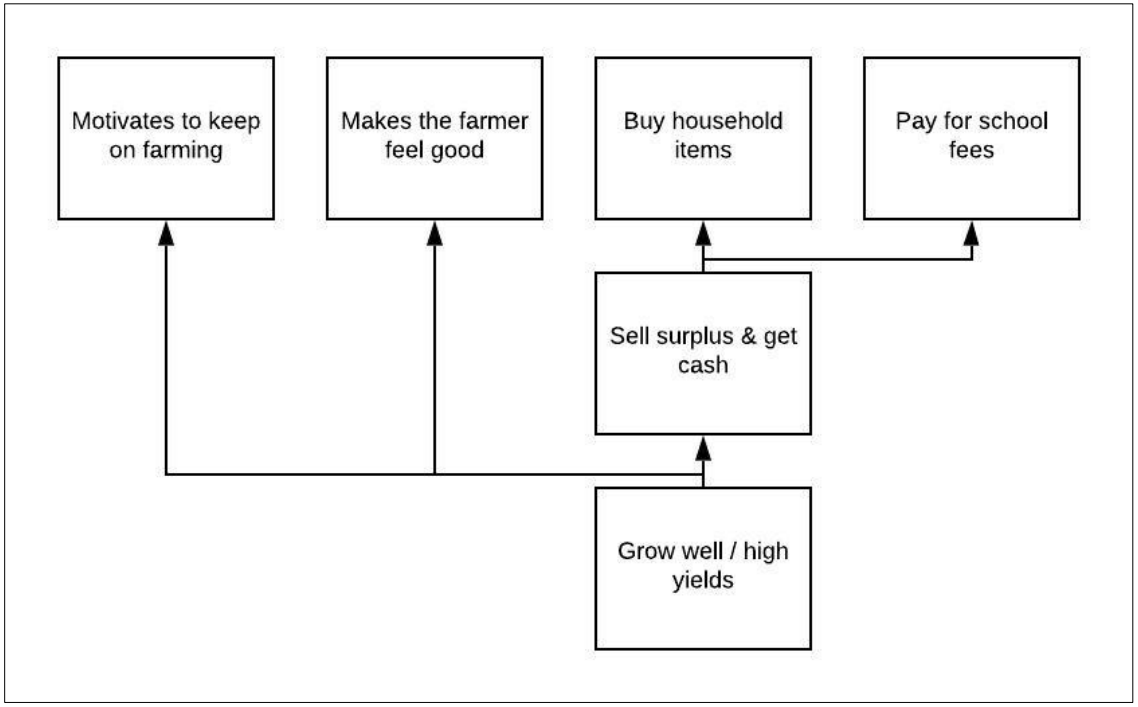
Why did you choose for this input?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Feed the animal	Farm management	**3**	Cow to eat (protein)	Farm management	**4**
Increase milk production and quality	Farm management	**2**	Use for firewood	Household	**2**
Cooking fuel (firewood)	Household	**1**	Increase milk production	Farm management	**1**
To keep manure continuously on the farm	Farm management	**1**	Make dairy meal unnecessary	Farm management	**1**
Learned to make a shed	Farm management	**1**	Build a house	Household	**1**
			Good for the health of the cow	Farm management	**1**
			Used during the dry season to cover manure	Farm management	**1**
		8			**11**

Why is this important to you?

Vihiga		#	*Busia*		#
Answer	**Category**		**Answer**	**Category**	
Pay school fees	Earning money from farming	**2**	Good for the children	Household: food	**2**
Calf to drink	Farm management	**1**	Buy food things she needs	Household: food	**1**
Buy dairy meal	Farm management	**1**	Buy treatment for the cow	Farm management	**1**
Children feel sick when they don't drink tea	Household: food	**1**	Pay for school fees	Earning money from farming	**1**
Sour milk and use for cooking	Household: food	**1**	Cows are unhealthy and easily affected by diseases	Farm management	**1**
Good produce	Farm management	**1**	Needs for cooking	Household: food	**1**
Choose the best way	Farm management	**1**	With a lot of sun, it loses it appetite	Farm management	**1**
		8			**8**

Annex 4 Focused diagram beans Vihiga



Selection of justification and motivation for the choice of CAN & DAP in Vihiga county.