

# Information needs of Smallholder Sesame Farmers in Bangladesh

## Abstract

Behind every decision lies a need for information. In this paper, the decisions of smallholder sesame farmers, related to their individual value chains, were identified. The specific information needs behind each decision were derived and analyzed, based on the level of awareness of the relevance of that information. Furthermore some information dissemination systems were studied to see what role they play or could play in the information networks of the farmers.

It was found that from all the information needs, information on fertilizer use and post harvest activities were ranked the highest information needs. Furthermore, the gaps in information between the information available and the information used and accessed by the farmers differed per stage of the value chain. Regarding the sources, it was evident that the majority of the farmers used their own experience and knowledge to fulfil their information needs during the value chain. The other sources were utilized significantly less often.

Finally, the studied information dissemination systems did not play a (large) role in the lives of the farmers. Some systems, such as the Trainer in the Pocket concepts and the AICC's, show much potential to fulfil the role of information provider or disseminator.

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## Abbreviations

AIS	Agriculture Information Services
AICC	Agriculture Information Communication Centre
BRAC	Bangladesh Rural Advancement Committee
DAE	Department of Agriculture Extension
DAM	Department of Agriculture Marketing
EiA	English in Action
FGD	Focus Group Discussion
MFS	Market Oriented Farmer Field School
NGO	Non-Governmental Organization
RF	Resource Farmer
SAAO	Sub-Assistant Agriculture Officers
UDC	Union Digital Centre
WMG	Water Management Group

# 1 Executive summary

The primary intention of this paper was to define information needs of smallholder sesame farmers in South West Bangladesh, identify the sources (and thus their network) used to fulfil these needs and analyze the level of consciousness the farmers had towards the importance of certain information in their farming and market related decisions. This research was performed under the supervision of the Blue Gold program, a water management development program in Bangladesh with an economic development component.

When conducting the qualitative research for the information needs, some existing information dissemination systems were investigated as well. The possibilities and opportunities of these systems, for the farmers in the Blue Gold working area, were assessed. In this section, a quick overview of the methodology is given. Furthermore, the key results are presented, together with the final recommendations. This is done separately for the main focus of this paper, information needs, and for the information dissemination systems.

## 1.1 Information needs

To get a clear overview of all the information needs, 11 Focus Group Discussions (FGD) were held in Polders 30 and 22. During these FGD's approximately 155 farmers were questioned about their information needs and the utilized sources during the entire (individual) value chain. The value chain was divided into nine separate decision stages for which the farmers need information.

After all the information needs were identified per stage of the value chain they were analyzed on the basis of consciousness. This implies, the level of awareness the farmers have regarding the importance of certain information. Firstly, these needs were classified in conscious or unconscious, depending on the answers they gave in the FGD's. However, this was found to be insufficient. From the discussions with the farmers, the research found that the information needs cannot simply be divided between the two classifications above. A new classification was added, subconscious information needs. Three motives drove the subconscious needs; confirmation, doubt and lack.

After conducting the research the following key results were found:

- Information on fertilizer use and post-harvest activities were regarded to be the most important needs. Farmers deliberately requested more information on those subjects (see Table 11, page 20).
- Farmers are conscious about the importance of the majority of the questioned information needs. However, some of these needs were subconscious because the farmers were not sure if they were using the optimal information or simply lacked the information but were conscious about its importance. Lacking information was the most significant motive for information needs being perceived as subconscious (see Table 12 & 13, page 22 and 23)
- The majority of farmers utilize their own experience to acquire information for their decisions. This holds for most of the stages in the value chain. Surprisingly, the farmers did not use the extension officers as an information provider very often (see Section 4.3).
- It was found that many farmers lack critical awareness and an active seeking behaviour. The current needs which are fulfilled by external sources are, in most cases, provided to the farmers. The farmers do not have the tendency to 'go and look' for the information when they need it.

The findings of this research can help the Blue Gold program to tune its interventions and activities to the specific needs of the farmers. Clear and defined information needs can help in this process. Blue Gold can assist the farmers with the identified information gaps in several ways. The program could provide the farmers with the information they lack. Furthermore, Blue Gold could assist the farmers in the provision of the appropriate sources and develop a stable information flow between

the recipient and source. The latter is more in line with the exit strategy, where the active role of Blue Gold as an information facilitator has to be reduced.

Moreover, it is recommended to take the level of consciousness of the defined needs into account. The needs are not homogeneously assessed by the farmers, regarding this consciousness. Hence, Blue Gold should act accordingly when considering the appropriate interventions and actions to assist the farmers.

In the long run the farmers will have to be able to rely on their own networks and connections with different relevant market actors. It is essential that Blue Gold facilitates the creation and expansion of these networks. The role of resource farmers (RF) can play an important role in the networks of individual farmers. They are trusted pillars in the smaller farming communities around which Blue Gold could create networks to avoid complicated individual networks for every farmer. Many farmers have similar information needs. The fulfilment of these needs could be bundled under the RF's network, who could disseminate if further (horizontal learning).

Finally, it is recommended that Blue Gold includes the role of catalyst for critical awareness. Sustainability is fundamental to development programs in general and this awareness is essential for the sustainable economic growth of these farmers. The farmers need to become critical about the decisions they make and more importantly the information they use. This way they can make more effective determinations of relevant information which could lead to optimal decisions.

## **1.2 Information dissemination systems**

During this research five information dissemination systems (platforms and tools) were examined. The structures and disseminating activities were studied. Furthermore, the potential for the farmers and Blue Gold was determined. The three main systems are discussed below because of their potential for Blue Gold (see Section 4.5.4 and 4.5.3 for more information on the remaining systems).

### *Union Digital Centres (UDC)*

These centres work with a business model where two local entrepreneurs run the UDC's and earn money by offering administrative services. They currently do not provide agricultural services, however Katalyst has set up several interventions in the North of Bangladesh to re-include these agro-services in the centres. They are possibly expanding the interventions if they are a success. For Blue Gold it can be very beneficial to follow these interventions and their results.

### *Agriculture Information Service (AIS)*

This department of the Ministry of Agriculture disseminates agricultural information through three main channels; print, electronic and ICT. They have several, for Blue Gold interesting, services that are available to the farmers in the working area, especially the Agriculture Information Communication Centres (AICC). These centres have a similar structure as the UDC's, but focus on the agriculture services. One AICC was visited in Polder 30 which showed much potential for the farmers in that area (Batiaghata). It is recommended to include this centre as source for the surrounding farmers. Furthermore, it could be a platform for Public Private Partnerships (PPP). They are currently not working PPP's but it could improve the effectiveness and capacity of provided information.

### *Trainer in the Pocket*

This concept is currently part of the English in Action program. It works with mobile phones, SD cards filled with training material and portable speakers. In the English in Action it is used to enhance the English skills of both the teachers and the students. This concept shows much potential for the Blue Gold Program. There are several resemblances between the structures of this concept and Blue Gold (see Section 4.5.5). It is highly recommended to consider this 'low investment' concept. It is a 'simple' method to disseminate information to a large group of farmers. Again the RF's could play an important role in this concept. The largest challenge is to assess the training material, as it cannot be frequently updated.

## 2 Introduction

Bangladesh is, like many developing countries, predominantly an agrarian country. However, the share of the agriculture sector in the gross domestic product (GDP) was 'merely' 16.1% in 2014, the least of the three main economic sectors (i.e. agriculture, industry and services). Yet, the agriculture sector dominates the employment market, employing over 47% of the total work force (2010) (World Bank, 2016). This socio-economic discrepancy can be encountered in many developing countries. According to Lokanathan and Kapugama (2012), the low contribution and productivity can be attributed to several market failures such as; unstable, inefficient or non-existing markets, poor market linkages, poor infrastructure and information asymmetry.

With respect to the latter, the Growth Report, issued by the World Bank, states that high growing economies benefit immensely from the utilization of information and transforming that into knowledge. It was categorized as one of the characteristics of a fast growing economy (World Bank, 2008). This is not surprising, as information and knowledge are seen as important drivers of personal and societal development, besides the traditional production factors (i.e. labour, capital and land) (World Bank, 1999). From an agriculture perspective, information can also be regarded as an important input and good of agriculture (Oguya, 2007). Several studies have found that a stable and increased flow of information and knowledge between farmers and other market actors has a positive effect on agricultural development (Fawole, 2008). Asaba et al. (2006) added that this would lead to '*improved rural livelihoods, improving quality and yield, food security and national economies*'.

However, information asymmetry remains a tenacious problem in the agricultural sector of developing countries. Smallholder farmers often do not have access to all the relevant and available information necessary for them to make optimal decisions. A combination of low awareness of the relevance of information on the demand side, weak market linkages between market actors and poor information dissemination systems are constraints of the perfect information condition. These constraints can also affect the information seeking behaviour of an individual. Personal, environmental and 'role' related barriers stand between an individual's information need and the way he/she will pursue this need (Wilson, 1997).

First of all, there is an issue on the demand side of the market. Many farmers cannot or do not make the clear distinction between relevant and irrelevant information. Such consciousness is essential for efficient information seeking and distribution. Once the farmers have developed a significant level of consciousness, resulting in a comprehensive notion of what information is useful and what not, the allocation of information in a market would become more efficient. This, in time, could result in more economic benefits for all market actors.

On the other hand, stable and efficient information flows between market actors are imperative for the supply side of information as well. These market actors include; government policy makers, the private sector as well as the strategic implementation and extension of development programs. According to Morrow et al. (2002), information can be seen as '*one of the most valuable resource in agricultural and rural development programs*'. Understanding information needs and the decision making process of smallholder farmers unravels opportunities of target specific development interventions (Gladwin, 1989; Zarmai et al., 2014). The main focus of agricultural development programs and their interventions are the interests of the group they are targeting. Clarifying the needs and decisions of a target group is therefore essential to keep that focus.



Lastly, reliable and structured dissemination systems are essential in the correction of this market failure (i.e. information asymmetry). Guèye (2009) believes there are at least two important arguments for that. First of all, such systems could assist farmers in changing and optimizing their knowledge and attitudes. Secondly, the farmers simply need information to make decisions.

Eventually, the network of the individual farmers or farming community will have to work as a catalyst and keep the flows of information running, playing a large role in the sustainability of information dissemination and economic development. This should be a reliable and extensive system of multiple actors which provide and obtain information from this system, built around the smallholder farmer. Involved parties in such a network should include farmers, extension officers, development programs, market actors (e.g. input providers and buyers), and other private sector stakeholders.

One very important condition needs to be met with respect to the information provision in general. The attitude of information services, both public and private, need to regard the farmers as clients with specific needs instead of simple recipients of information. A change from supply-driven to demand-driven information provision is needed. Pluralistic Advisory Services could be a sustainable strategy were the public and private sector work together in provider information (Schmidt & Fischler, 2012).

Not many papers have researched the specific information needs of a target group. This was confirmed by a study done by Magne et al. (2010). They mentioned that most farm management studies focus on the decision-making process and its outcomes instead of the information needs, which are observed in an indirect manner by analyzing the decisions making processes. Just et al. (2003) state that even less studies research the assessment of the quality of information, which lies at the basis of the decisions.

The aim of the research was to identify and analyze all the information needs smallholder sesame farmers have in South West Bangladesh and to get an understanding of the constraints they face regarding these needs.

This study was done under guidance and with the collaboration of Blue Gold, a development program in Bangladesh. Blue Gold is primarily a water management program with the main objective of ensuring sustainable water management by forming water management groups in designated polders, throughout South West Bangladesh. This program includes 5 components which are each responsible for a different aspect of the same eventual objective. Component 4 is responsible for business development within the Blue Gold working area. It attributes to the main objective by developing several value chains that can improve the socio-economic situation of the farmers and community as a whole. The paper focuses on the business development of the farmers within the working area of Blue Gold.

The study approaches the needs and the interests of the farmers from a bottom up perspective. This will be incorporated in the framework of the paper, in the form of a model, which is explained in the methodology section. The methods of obtaining the information and data are elaborated as well. The following section, results, will be structured on the basis of this model where the information needs are discussed and gaps are identified. Furthermore, this section will analyze the different information dissemination platforms and tools. Finally, the results of the research on information needs will be summarized in the conclusion and recommendations will be presented.

### 3 Methodology

For the remainder of the paper it is assumed that smallholder farmers are rational economic actors. They are risk- and cost-minimizing and derive their decisions from that perspective. Each farmer will make a decision based on the marginal gains and costs of the obtainable information. The rational economic actors have imperfect information, but base their decisions on the information currently available to them. The farmers are generally risk averse when it comes to production, investment and resulting income. Regarding the cost of information, farmers will only acquire certain information if, in their perception, the relevance and resulting income of incorporating a type of information in a decision is lower than the costs to obtain it. Due to a high perceived risk related to this cost (i.e. risk of wrong or absent information) many information is not utilized.

The analytical framework of this paper is divided into two sections. The first part focuses on the information needs of the farmers and the utilized sources. Secondly, some information dissemination systems (i.e. platforms and tools) were studied and possible potential implications for the Blue Gold program were assessed. The findings and potential are not included in the final conclusion, instead this is described in the recommendation section. For both sections of the framework, qualitative methods were used to describe the information needs of smallholder sesame farmers and the different information dissemination platforms and tools.

The following objectives were determined to achieve the aim of this research:

- Identify the 'optimal'<sup>1</sup> set of information needs for every decision in the sesame value chain.
- Identify the information needs during the entire sesame value chain
- Identify the utilized sources
- Classify these needs on the basis of consciousness
- Identify information gaps

Furthermore, the following objectives were developed for the second section of the research:

- Identify the structure of each platform and tool
- Identify the dissemination activities and techniques of each platform
- Assess the potential of each platform and tool

#### 3.1 Information needs

A model was developed through discussions with Blue Gold staff and Focus Group Discussions (FGD) with farmers<sup>2</sup> to identify the information needs and the used sources of sesame farmers in rural areas of Southern Bangladesh.

After concluding the model, the needs were analyzed based on the level of consciousness. Information needs cannot all be assessed in the same way Farmers are not always aware of their information needs, so-called unmet needs, and as a result do not seek such (appropriate) information, let alone that they know of its availability. To fulfil conscious or unconscious needs, a group or individual will have to acquire information which creates an information need (Zarmai, Okwu, Dawang, & Nankat, 2014). This classification has been done before, however this paper added one more category; subconscious needs. This addition was done to clarify and fully comprehend the entire spectrum of conscious levels with respect to information needs, as only conscious and unconscious does not provide that.

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<sup>1</sup> Optimal meaning; according to the information available and proven to be relevant for the farmers.

<sup>2</sup> For the remainder of this paper, when 'farmers' are mentioned it refers to the smallholder sesame farmers (male and female) from the FGD's.

### 3.1.1 Decision and information model

To fully describe the information needs of smallholder sesame farmers a simple three step decision and information model was developed. With the use of this model the information needs become evident and possible gaps are easily located.

The first step of the model divides the sesame value chain into different decision stages, farmers encounter. The value chain is broken up into nine stages in chronological order, from the moment the farmers decide what crops to cultivate till the point they receive their income after selling the sesame.

Step 2 includes what information the farmers need to make optimal decisions, for each stage separately. The information needs were gathered through discussions with Blue Gold staff and based on their experience. This step shows a preliminary 'optimal' set of information the farmers need to make the optimal decisions in every stage (i.e. according to the Blue Gold staff, the set of information needs which need to be confirmed and assessed during the FGD's).

Finally, in step 3 the information needs as actually perceived by the farmers are listed. Again this is done according to the nine stages. To obtain this information a qualitative research was done through a set of FGD's.

Included in step 2 and 3 is a list of sources. For step 2 this includes sources which do or could play a role as information provider, as for step three the list depicts the sources the farmers mentioned and use. Subsequently, information gaps become clear showing where improvements could be made in the information access of the farmers. It can also clarify the scope and focus of future interventions.

### 3.1.2 Focus Group Discussions

The FGD's were held in two different polders in the Khulna Division. 7 FGD's were held in Polder 30 and 4 FGD's in Polder 22<sup>3</sup>. Each FGD counted 10-15 participants. In total 155 farmers participated in the discussions.

Table 1. Participant distribution

Total = 155 participants	Polder 30	Polder 22
Male	45	33
Female	52	25

One control group was included in this set. This discussion group included farmers which are part of a Market Oriented Farmer Field School (MFS)<sup>4</sup>. These farmers have been exposed to several training sessions and demonstrations provided by Blue Gold over the last year. During the initial analysis of the total results, the results of this group are not included and only used as control group.

For the group selection the following criteria were used:

- Members of Water Management Groups (WMG, farmer organizations)
- Medium sized sesame farmers (not more than 500 decimals of land)
- Mixed groups, 50 percent male/50 percent female
- Not an MFS member

Sesame farmers were chosen since sesame is not used for own consumption, it is entirely market oriented. The participants were selected from different WMG's in the appointed areas by the Blue Gold field staff.

<sup>3</sup> See Appendix 1: Figure 4 & 5 and Table 15

<sup>4</sup> See Appendix 1: Figure 6 for elaboration

For the FGD's a set of 34 questions was developed related to the different decision stages and the necessary information needed for these decisions (see Appendix 1: Table 16, 17&18). The questions were translated and written onto small flashcards. All questions could be answered with 'Yes' or 'No'. This was done to avoid unnecessary difficulty during the exercises (i.e. with translation and understanding of the questions).

The discussions groups consisted of two separate exercises. For the first exercise the entire group was split up into two equal groups and the second exercise was conducted with the whole group. The first exercise has a data set of 19<sup>5</sup> (sub) groups whereas the second exercise has a data set of 10 groups.

#### *First Exercise*

For the first exercise the 34 questions were split up into 4 parts. The first part was related to the knowledge on suitable crops for their land and additional information. The second part focused on land preparation and inputs. The third part was limited to the sowing, production and harvesting activities. Finally, the fourth part queried the information used and collected when selling sesame and during post-sales activities.

Both groups received a large sheet of paper with 2 headings and columns. One heading said: 'Yes I do' and the other 'No I do not'. The groups got a set of questions associated to the 4 parts. They were asked to discuss with each other and put the different questions cards in the most suitable column. After both groups had finished the exercises the answers were registered and before the cards were collected some follow-up questions were asked to clarify and sometimes verify the answers. Through these questions the farmers were forced to rethink their answers and present their arguments. This often led to more discussions between farmers.

Subsequent to the follow up questions some of the answers changed. This was sometimes because they did not fully understand the question or rethought their answers after a small discussion with other participants.

#### *Second Exercise*

When all the questions were answered and the data collected, the participants were asked about the sources they use to collect the information. This exercise only focuses on the questions from exercise one, which have been answered with 'Yes'. The participants had to identify the sources they used to obtain the information from the following list:

1. Own experience/knowledge
2. Ask other farmers and family
3. Contact input provider
4. Contact Extension officer
5. Contact Buyers
6. Contact others.

Once more, the participants had to discuss the sources they used to retrieve the various information needs. They were allowed to identify more than one source per question. All the mentioned sources were then documented and later on analyzed (See Appendix 1: Figure 7 for photographs).

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<sup>5</sup>A total of 11 FGDs, 2 subgroups per FGD = 22 subgroups. 1 Control FGD is excluded (-2 subgroups) and in 1 FGD both exercises are performed with the group as a whole(-1 subgroup). 22-2-1= 19 total subgroups

## 3.2 Consciousness

To explain the relationship between the registration and processing of information and representation in your mind several adjectives of consciousness are needed (Hilgard, 1980).

This study assessed the level of consciousness, the awareness of the information's relevance for a decision, of each need using the FGD's and focusing on the follow up questions. The levels of consciousness are defined in the form of conscious and unconscious needs. Using the answers presented by the farmers and knowledge on farmers' awareness regarding information (e.g. through staff experience and knowledge) the levels of consciousness were deducted.

Furthermore, the needs are analyzed on the basis of fulfilment. Do the farmers satisfy these needs by seeking the available information or not?

Finally, the consciousness of these needs is re-examined in the form of subconscious needs. This subcategory in the classification is defined by a feeling of uncertainty expressed by the farmers regarding the relevance of the information they are currently using in their decisions.

These preliminary assessments were then discussed with several staff members in both the field- and head office of Blue Gold for the final classification.

## 3.3 Sources

The sources for these needs are essential to create a full understanding of the information needs and their significance in the farmers' daily decisions. All sources used by the participants will be examined using the answers of the second exercise in the FGD's. The sources will be studied according to the nine stages of the sesame value chain. The paper will examine how many of the participating farmer groups (from the second exercise) used the various sources to obtain information to study the importance of each source.

## 3.4 Information Dissemination Systems

Existing information disseminating systems do not play a large role in the lives of rural farmers. There are many information services available throughout Bangladesh, using every form of media available. However, these are mostly driven by supply of the information. In most cases, the actual demand of farmers for certain information is not the basis on which such platforms and tools are developed. Besides, the awareness among farmers is very low. Most farmers do not know about the existence of the information services or cannot access them.

This research focuses on a few of the existing platforms and tools, which are incentivized by the Bangladesh government and internationally funded development projects. In-depth interviews with involved parties and employees of information dissemination platforms and tools were held to get a good understanding of the services they offer.

The different information dissemination platforms and tools which were studied are listed below:

- **Union Digital Centres (UDC):** an office responsible for helping farmers with digital services in governmental Union offices, the lowest tier of local government.
  - o 3 UDC's, in Polders 30 and 22, were visited where interviews with employees were held.

- **Agriculture Information Services (AIS):** a department of the Ministry of Agriculture of Bangladesh which is responsible for the dissemination of agricultural information. The research mainly focused on the **Agriculture Information Communication Centres (AICC)**.
  - o An interview with the divisional head office of the AIS in Khulna was conducted and there was a field visit to one of the AICC's where a present employee explained the activities and services of such centres.
  
- **Trainer in the Pocket:** a concept of English in Action, a DFID<sup>6</sup> funded project which works with teachers and students to improve their English language skills.
  - o An employee of the English in Action project was interviewed and explained the concept in detail.
  
- **Smart phones & Community Radio:** there are many possibilities and opportunities in the form of new (smart phone) and old (radio) media but before looking into these options it is essential to have an impression of the current usage of the appropriate media, smart phones and radio.
  - o A small survey was carried out with questions regarding the use of these forms of media.
  
- **Department of Agriculture Marketing (DAM):** a department of the Ministry of Agriculture responsible for gathering and analyzing market information relevant for the different market actors.
  - o An interview was conducted with a DAM official at the Dhaka Head Office.

Through the in-depth interviews with involved parties and employees a good understanding was developed of the sources mentioned above. The information is present and the services exist but there is a gap between the farmers and the sources. Projects such as Blue Gold could play an important role as broker between the recipients and providers in the field of agricultural information. Eventually, it would be beneficial for both provider and recipient of the information from these systems that the effective and efficient information dissemination systems would be incorporated into the farmers' network. This increases the available knowledge for the farmers and strengthens bonds between different stakeholders in the market.

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<sup>6</sup> DFID is the British Department for International Development

## 4 Results

### 4.1 Information needs

#### 4.1.1 Decision and information model

The contents of the model will be presented as follows. The first two steps will be explained, elaborating on the nine decisions stages in the sesame value chain and the information needed to make optimal decisions. Finally, the information needs of the farmers will be presented on a stage by stage basis (see Appendix 2: Figure 8 and 9).

As mentioned before, the first step of this model shows the relevant decision stages a farmer encounters during the sesame season. The various stages, including significant information needed, are listed below:

1. **Crop Decision**<sup>7</sup>: in this period the farmers have to decide what crop(s) to cultivate, what crops are suitable<sup>8</sup> and how to allocate their land.
  - They should need information on suitable crops; difference in yields, technical practices and net income for each of the suitable crops.
2. **Land preparation**: For sesame production the land has to be tilled. The farmers can do this using power tillers or tractors.
  - To make this decision optimally the farmers should obtain information on the various tillage techniques (machinery and methods) and cost and payment differences.
3. **Acquiring inputs**: during this stage they need to decide on seeds and fertilizers. The farmers could purchase the seeds or use their own.
  - Information on different seed varieties is essential and relevant information of those varieties (prices, costs, techniques, quality etc.). Sesame is quite a stable and low risk crop which does not need fertilizer. However, with the right amount of fertilizer production increases. Information for this stage should include info on fertilizer. Finally, nutrient status and moisture condition of the land is very important. This plays a large role in quality of the eventual sesame and influences the sowing date.
4. **Sowing**: this is the time the seeds are planted.
  - Information on several sowing techniques can be very helpful for the farmers, as some techniques are more productive than others. Moreover, the proper seed rate per bigga<sup>9</sup> is very important and has a large impact on the level of production.
5. **Cultivation**: during cultivation farmers are busy with disease control and weeding.
  - Even though diseases are seemingly rare in the case of sesame, information on diseases and pesticides is important during this stage. Additionally, the farmers should be aware of the benefits of weeding during production.
6. **Harvest and post-harvest**: after cultivation the sesame needs to be harvested, stacked, dried and cleaned. The manner of tackling these activities has large impact on the final product.
  - For the best possible decisions in this stage farmers should acquire information about dry post-harvesting techniques. The moisture level is very important for the quality and price of sesame (Tunde-Akintunde, Oke, & Akintunde, 2012), which indicates the significance of proper techniques.
7. **Storage**: in this stage the farmers have to make a decision on storage; where, how and how long. The latter is economically important due to seasonal price changes.
  - Information on technical storage practices is significant for the farmers in this stage of the value chain.

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<sup>7</sup> Stage 1 is general and applies to all farmers (not exclusively for sesame farmers). From Stage 2 onward the stages are related to sesame production.

<sup>8</sup> Suitable crops refer to the knowledge of the existing land-climate-crop relationships.

<sup>9</sup> Bigga is a local measurement for land. Polder 30: 1 bigga = 50 decimals and Polder 22: 1 bigga=33 decimals

- From an economic perspective, information on seasonal and annual price changes and trends including the drivers behind these economic processes could be useful for the farmers (e.g. if they have the financial capability and means of delaying the sales).
- 8. **Selling:** Deciding how much, where and when to sell are the main activities during this stage. Price information is the most important information need during this stage.
  - For this stage price information is of much importance. Furthermore it would benefit the farmer to know what the demand and supply forces are in the market and how they affect the price.
  - If sold at the market, the product has to be transported. Information on transport options and costs are important here.
- 9. **Saving and credit:** finally, after receiving their income the farmers decide what to do with it. In this stage decision related finance and future investment for new crops should be taken into account.
  - For the farmers who are able to save part of their income, it should be in their interest to seek information about the saving opportunities.
  - Now that the farmers have concluded their sesame production they start thinking about the preparation for the next crop in their cycle, in most cases rice. Some crops need investments which need to be financed. Information on credit systems could be of use for the farmers.

#### 4.1.2 Information needs during the crop decision stage

In the first stage, knowledge regarding other suitable crops (except rice and sesame) was very limited. Most farmers did have an idea of what crops they could cultivate, but the farmers barely provided more information about these suitable crops besides naming them. Some farmers mentioned collecting price and cost information on other crops such as watermelon and vegetables, however they did not keep a record of this information. This means they cannot access and utilize this information again in the following years and the benefit is lost. An important aspect in this stage is the deeply rooted cropping patterns. For generations, sesame farmers have focused on two main crops a year, sesame and rice. The farmers express the need for more information on suitable crops but lack appropriate attitude towards actively seeking alternative information, because they trust and rely on their habituated crop choices.

Table 2. Total FGD results, questions related to stage 1

Stage	# of Yes	% of Yes	# of No	% of No
1	43	45,3%	52	54,7%

#### 4.1.3 Information needs during the land preparation stage

In the land preparation stage it was clear that the farmers knew about the tillage possibilities and the differences. All participants responded with 'Yes' to the question related to land preparation. The farmers thought they had the right information and were applying the optimal methods and techniques (i.e. use of power tiller instead of tractor and till the land at least three times). The participants did not express a need for more information during this stage.

Table 3. Total FGD results, questions related to stage 2

Stage	# of Yes	% of Yes	# of No	% of No
2	38	100,0%	0	0,0%



#### 4.1.4 Information needs during the input acquiring stage

In this stage of the value chain the farmers have been exposed to new information in the last few years. For sesame in this region of Bangladesh there are two major varieties; brown and black sesame. The selling price and demand of black sesame is higher and the differences in cultivation techniques and yields are small. Both the Government of Bangladesh (being the largest provider of sesame seeds) and development programs have disseminated information about this relatively new and more profitable variety. The adoption of black sesame among the farmers was very high. With a few exceptions, all farmers have been cultivating black sesame for the past two or three years. Moreover, the input of seeds varies between the discussion groups. Many farmers use own seeds and if necessary buy more on the market while some only rely on bought seeds.

Fertilizer is the other input which can be acquired for the cultivation of sesame. Interestingly this was considered to be the most important information need according to the participants. The same conclusion was drawn in the study done by Lokanathan and Kapugama (2012). Most farmers stated that they use some fertilizer during production but they lack critical information to properly apply it. Proper application of fertilizer includes optimal quantity per bigga, time to apply it and how to apply it.

Table 4. Total FGD results, questions related to stage 3

Stage	# of Yes	% of Yes	# of No	% of No
3	64	56,1%	50	43,9%

#### 4.1.5 Information needs during the sowing stage

The most important information need in this stage is the knowledge and understanding of different sowing techniques. All participants used a sowing technique called broadcasting. Some mentioned they had received information on other techniques through trials and demonstrations but none of them had applied it themselves. A major constraint, according to the farmers, is the level of risk of these new techniques. Most farmers in this region of Bangladesh are risk averse because of the lack of a necessary economic buffer needed to take risks (e.g. apply new techniques) which may possibly lead to a failed harvest. A large barrier exists between informing and demonstrating new techniques and the actual adoption.

As for the seed rate, the participants mentioned an average rate between 1-2 kilograms per bigga which is higher than the optimal rate of 750 kilograms per bigga.

Finally, all the farmers described the same method of assessing the land condition:

Farmer Batiaghata: *"I go to the field around the time that I think it will be ready. When I arrive I look at the ground and search for cracks in the ground, small cracks means good condition and big cracks means bad condition. Then I collect some soil and rub it between my fingers to check the moisture, if it feels moist I know it is good to sow"*

The farmers understood the importance of good soil condition for sesame but did not express the need for more information on this topic. Backed by tradition, they trust their existing methods and experience.

Table 5. Total FGD results, questions related to stage 4

Stage	# of Yes	% of Yes	# of No	% of No
4	36	65,5%	19	34,5%

#### 4.1.6 Information needs during the cultivation stage

Generally sesame does not require much attention after it is sown. It is not prone to many diseases and the use of pesticides is low for this crop. This was confirmed by the sample. None of the farmers used pesticides and did not seek information about either diseases or pesticides. When asked the question what they did in the case of a disease the answer was unanimously: nothing. This might not be wrongful thinking on their part, if in a certain case doing nothing would not reduce the yield. In that case, 'doing something' (i.e. buying and using pesticides) will only reduce their income without positive net results. On the other hand, all farmers mentioned weeding to be part of their activities during production. However, not many farmers fully understood the importance of weeding. Clearly the largest information need in this stage is information on diseases and pesticides.

Table 6. Total FGD results, questions related to stage 5

Stage	# of Yes	% of Yes	# of No	% of No
5	17	47,2%	19	52,8%

#### 4.1.7 Information needs during the harvest and post-harvest stage

During this stage there was a clear consensus about the information they use. The moisture level of the produced sesame is of significant importance to the quality of product. After harvest almost all farmers stacked the sesame in the field or on the side of the road for 2-3 days, after which they took it to their homes for drying, cleaning and storing. Most farmers understood the importance of these activities and most used 'blue plastic nets' for drying sesame. The cleaning is mostly done by the wind and in some occasions farmers use electric fans.

The interesting aspect of this stage was that many farmers doubted the methods and information they apply in this period. They did not collect information but were uncertain about the way they handled these situations.

According to the Blue Gold staff, some sesame farmers poured water on the newly harvested sesame to increase fermentation, which can have negative effects on the final product. The farmers were all aware of these negative effects and did therefore not use this technique.

Table 7. Total FGD results, questions related to stage 6

Stage	# of Yes	% of Yes	# of No	% of No
6	76	70,4%	32	29,6%

#### 4.1.8 Information needs during the storage stage

Some information needs of this stage are similar to the previous one; information on appropriate post-harvest techniques including storage. None of the farmers use storage facilities, they do not think they are available in their area and prefer storing it at home under their own care.

Another information need is related to seasonal price changes, which is also applicable for the following stage. Right after harvest the supply for sesame is very high which has a negative effect on the price. Some of the participants were aware of the changes in price but did not collect and record these changes. If they had the financial and capacity means to store longer to receive a better price they did. However, this was not often the case, mostly because they could not wait that long for their income (urgent or immediate costs right after harvest).

Table 8. Total FGD results, questions related to stage 7

Stage	# of Yes	% of Yes	# of No	% of No
7	9	50,0%	9	50,0%

#### 4.1.9 Information needs during the selling stage

Economically speaking this is the most important stage for the farmers. Obviously price information is the key need in this time. Most farmers sell at nearby markets and occasionally at farm gate, depending on the contact and relationship with buyers.

The participants explained that they do sometimes wait for a better price and sell the production in parts, in some cases up to November or December<sup>10</sup>. Most farmers know the prices go up the later they sell (after harvest) but they cannot sell the whole production at the time when prices are highest because of earlier mentioned cash needs. They need the money for regular consumption, to pay for school, to pay off debts, etc. This all shows awareness of price fluctuations but simultaneously it presents more urgent needs which they cannot deny.

Farmers stated that they compare prices between markets and buyers and many have the buyers contact information. However, most of them did not collect price information before they go to the market. This is done by the time they arrive at the market with their product.

Quality of their final product is, in addition to prices, also very important to the farmers. Many complaints were made about problems at the market regarding quality. They mentioned always getting into discussions over quality with the buyers. The participants specifically requested more information about quality assessment, which is now based on own perception and experience.

Finally, many farmers need transportation to move the sesame to the markets. This is often done collectively and using cheap means of transportation. No apparent need for information was brought up.

Table 9. Total FGD results, questions related to stage 8

Stage	# of Yes	% of Yes	# of No	% of No
8	60	55,6%	48	44,4%

#### 4.1.10 Information needs during the saving and credit stage

Lastly, in this stage there were only a few information needs highlighted by a few participants. None of the farmers used credit through national or regional banks and only a few were able to save some of their income. This was then done at smaller regional banks which provided them with relevant information and offered the appropriate services. During this stage the majority of the participants did not collect information regarding investments and other preparation for the next crop.

Table 10. Total FGD results, questions related to stage 9

Stage	# of Yes	% of Yes	# of No	% of No
9	18	33,3%	36	66,7%

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<sup>10</sup> The usual sales period of sesame lies between July and October.

Below are all the information needs listed per stage (See Appendix 3: Table 19, 20 & 21 for FGD results per question and need):

Table 11. Information needs per stage

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9
Suitable crops	Tillage options	Fertilizer use	Sowing techniques	Diseases	Appropriate post-harvest techniques	Storage techniques	Sesame prices	Saving and credit information
Incomes of suitable crops	Cost differences of these options	Fertilizer prices and quality	Optimal nutrient status	Pesticides		Annual & Seasonal price changes and its drivers	Sesame quality	
Costs of suitable crops		Seed varieties	Optimal soil condition	Weeding			Transport	
Cultivation information of suitable crops		Seed prices	Seed rate				Annual & Seasonal price changes and its drivers	
		Seed quality						

## 4.2 Conscious, subconscious and unconscious

During field work it was found that analyzing information needs in a coherent way is a challenge. As can be seen in the descriptions of the needs in the previous paragraphs, farmers prioritize and utilize them differently. In this research the needs will be classified on the basis of consciousness. The notion of information needs and the classification between conscious and unconscious needs was first made by an American information scientist, Robert S. Taylor, in 1962. He studied information retrieval and believed an investigator could not only retrieve conscious information needs but unconscious needs as well, by asking the 'ideal question' (Taylor, 1962).

In this specific sample resulting from the field work, smallholder sesame farmers have to make a range of decisions during the elaborated 9 stages. In order to make these decisions the farmers will need information, which creates an information need. The information can be obtained in the following ways:

1. It can be provided from an outside source.
2. Farmers can actively seek information.
3. Farmers can rely on their own tradition, experience and knowledge.

More on the sources in Section 4.3.

Moreover, farmers can vary in the level of awareness regarding which information is useful and relevant for their decisions and which information is not. In this paper the needs are classified, based on the level of awareness, according to conscious and unconscious needs.

Finally, the needs can be fulfilled or not, meaning the farmers can choose to use this information in their decision making process or not. This choice of fulfilment is based on the consciousness or awareness of the relevance of the information.

This study characterizes 'fulfilled needs' as information to which farmers have access and which they use in their decisions. They will acquire this information using the one or more of the three methods of obtaining information mentioned above.

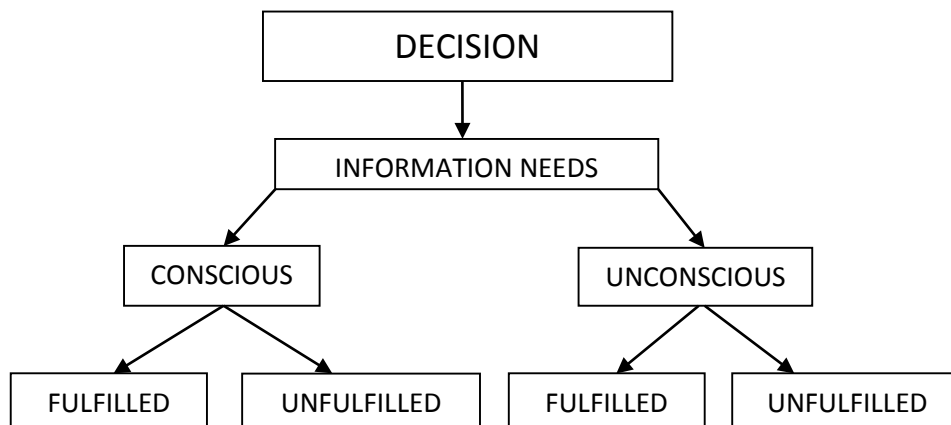
The farmers stated they exhaust reliable sources to obtain the available information on which they base their decisions. However, this does not mean the farmers are using the necessary information to make an optimal decision.

Unfulfilled needs can arise in two ways:

1. Individuals seek or receive information and **do not** use it.
2. Individuals do not have access to information and **cannot** use it.

The following figure shows the process of information need creation and fulfilment:

Figure 1. Decision and information need process



#### 4.2.1 Conscious

Conscious needs are defined as needs of which the farmers have a high level of understanding of the relevance or irrelevance of information which is necessary in order to make well informed decisions. This awareness can be forged through own experience, the use of readily available information or through shared experiences of others. For example, if a farmer has experienced a rise in production thanks to the use of a power tiller instead of a tractor, he/she has an understanding of the relevance of information on power tillers and realizes information on tractors is not important to him.

- **Fulfilled:** If a farmer consciously fulfils a need he/she bases his/her decision on this information because the farmer is aware of its relevance.
  - o Example: use of power tiller
- **Unfulfilled:**
  1. In this case, the farmer does not satisfy the need because he/she is certain that information will not be useful in the decision, or even lead to a bad one.
    - a. Example: not using tractors for tillage
  2. A need can also be consciously unfulfilled if the farmer is aware of the relevance of the information but does not have access to it.
    - a. Example: optimal fertilizer use

## 4.2.2 Unconscious

When a need is unconsciously perceived by the farmers, it implies that the farmers lacks awareness or significant understanding of the relevance or irrelevance of that information. The farmer will not know if the information is relevant or irrelevant for the decision he/she has to make. When the farmers experience this feeling of unawareness they will generally choose not to seek the information.

- **Fulfilled:** if the need is unconsciously fulfilled the farmer will satisfy this need using the information available to him/her. However, the farmer will not be aware of the relevance of this specific information with respect to the decision, they will simply 'do it'.
  - o Example: weeding
- **Unfulfilled:** Finally, if the need is unconsciously unfulfilled he/she will not act on this information and is fully unaware of the relevance of the information for the decision at hand.
  - o Example: credit information

The classification of the information needs can be seen below, using the defined levels of consciousness and fulfilment:

Table 12. Information needs classification: conscious and unconscious

Conscious information needs		Unconscious information needs	
Fulfilled	Unfulfilled	Fulfilled	Unfulfilled
Power tiller	2. Income and costs of the different crops	Suitable crops for their land	Fertilizer quality
Costs of different tillage options	2. Land preparation and inputs of the different crops	Seed rate	Different sowing techniques
Optimal times to till the land	1. Tractor	Weeding	Diseases
Seed prices	2. Fertilizer use		Pesticides
Seed quality	1. Use of water on harvested sesame		Credit
Fertilizer prices	2. Seasonal price changes		Investment for new crops
Seed varieties			
Optimal land condition & time for sowing			
Stacking, cleaning, drying and storing properly			
Transport			
Sesame prices			
Sesame quality (time of sales)			
Saving			

### 4.2.3 Subconscious

After analyzing the information needs and classifying them on the basis of the level of consciousness it was found that the two categories, conscious and unconscious, did not fully disclose the picture drawn by the farmers. Some farmers expressed doubts as to the appropriateness and relevance of the specific information they were currently using. This was the case in several occasions throughout the entire value chain.

Many participants noted that they understood the importance of specific information, but they did not know if this was the most optimal information at that given moment. For example, almost all farmers said they knew drying sesame is essential in that stage of production, however they are not sure if the methods used (so the information available) will deliver optimal results. The participants who stated this, believed there could be more optimal methods for this activity. Hence they could benefit from additional and better information. As a result an extra category was added to the classification above to situate this feeling of uncertainty in the analysis in the form of subconscious information needs.

Subconscious information needs have the same basic characteristics as conscious needs, namely the awareness of the information being either relevant or irrelevant to their value chain. They will fulfil most of these needs and act on this information, but at the same time they doubt the reliability and/or significance of it. Another characteristic of subconscious needs was found through the discussions with farmer groups. The information used to fulfil these needs is often based on own experience or passed down from generation to generation. The farmers do not actively seek other information from other sources because of a lack of resources and constraints regarding accessibility of information and its sources.

There are three degrees of subconscious information needs:

1. Confirmation: the farmers trust the appropriateness of their information but lack confirmation.
2. Doubt: the farmers are currently using information which they do not think is optimal for that decision.
3. Lack: farmers understand this information is important but they have no access to the optimal form of this information.

The subconscious information needs are listed below, according to the degrees of doubt:

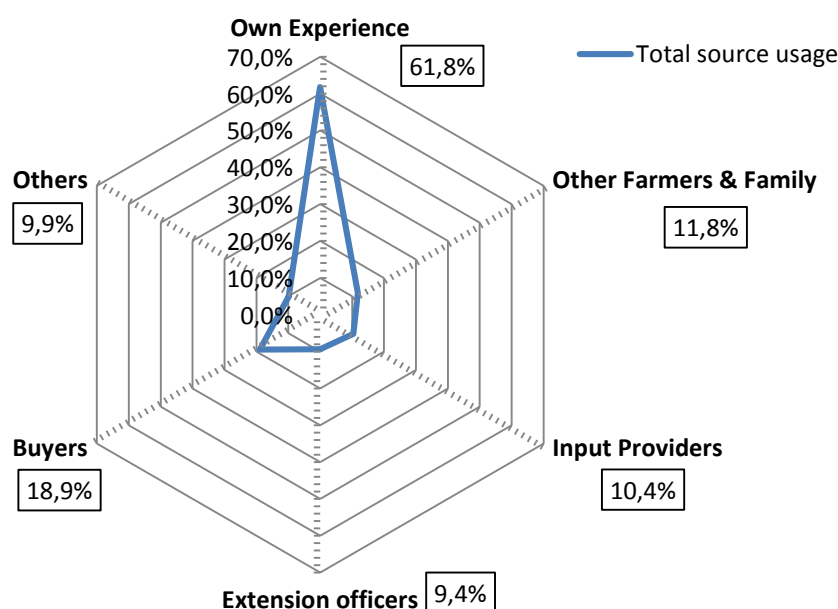
Table 13. Information needs classification: subconscious

<b>Subconscious Information Needs</b>		
<b>Confirmation</b>	<b>Doubt</b>	<b>Lack</b>
Tillage options (machinery and times to till)	Stacking, cleaning, drying and storing	Fertilizer use
Optimal land condition & time for sowing		Seed quality
		Sesame quality (end-product)
		Seasonal price changes
		Suitable crops for their land
		Income and costs of the different crops
		Land preparation and inputs of the different crops

### 4.3 Sources of information and their importance in the farmers network

In order to have a comprehensive understanding of the information needs, the sources of this information used to satisfy the needs should be included in the research. This will further help the program to narrow down its strategy and interventions, focussing on the information needs of smallholder farmers. When mentioning the farmers or participants in this section, this paper only refers to the groups which answered 'Yes' in the first exercise and identified the sources in the second. The data is analyzed per stage of the value chain and this section presents the results. For the full list of questions and respective source usage per questions see Appendix 4, Table 22 and 23.

In the case of smallholder sesame farmers it was found that the most relevant source of information was their experience and knowledge. Just below 62% of the participating groups utilized their own experience and knowledge to satisfy their needs, during the entire value chain. The utilization of all sources during the entire value chain for every information need can be seen in Figure 2. Figure 3 and Table 14 represent the usage of sources per stage



The percentage represents the share of farmers which mentions using that source in a given stage.

Table 14. Source utilization per stage, percentage of participants

Stages	% Own Ex.	%Other Farmers	% IP	%Extension officer	% Buyers	% Other
Crop decision	91,7%	16,7%	8,3%	25,0%	4,2%	0,0%
Land preparation	85,0%	25,0%	0,0%	10,0%	0,0%	10,0%
Acquiring inputs	26,3%	13,2%	52,6%	7,9%	15,8%	10,5%
Sowing	86,4%	13,6%	0,0%	4,5%	4,5%	22,7%
Cultivation	40,0%	0,0%	0,0%	20,0%	0,0%	20,0%
Harvest and post-harvest	86,7%	13,3%	0,0%	11,1%	11,1%	0,0%
Storage	100,0%	0,0%	0,0%	16,7%	0,0%	0,0%
Selling	23,1%	2,6%	0,0%	0,0%	69,2%	0,0%
Saving and Credit	38,5%	7,7%	0,0%	0,0%	0,0%	61,5%



Figure 3. Source utilization per stage



### **4.3.1 Own experience**

The vast majority of the participants relies on their own experience and earlier acquired knowledge to fulfil their information needs. This was predominantly the case throughout all 9 stages (Figure 3 and Table 14). For example, 91,7% of the farmers use the information acquired from own experience to make decisions during the first stage. Only in stages 3, 8 and 9, does the majority of farmers rely on another source other than own experience. It is not surprising that farmers rely this much on their own experience. This has been confirmed in a number of studies such as the one conducted by Lokanathan and Kapugama (2012). They found the same results in a number of South-East Asian countries.

Furthermore, the participants from this study mentioned information was often passed down from generation to generation. They were brought up with certain agricultural techniques, methods and preconceived notions of the market which they trust and have been using for years (see Appendix 4: Figure 11).

There is one limitation to the percentage mentioned in Figure 2 above, it is probably much higher for 'own experience'. Firstly, in the second exercise of the FGD's participants were only asked to name the sources of the information needs which they had fulfilled and collected, as the questions from the first exercise state. The farmers that answered this with 'NO', logically do not have sources for uncollected information so they were not included in this exercise.

In the previous section these information needs were classified as fulfilled or unfulfilled, fulfilled meaning the farmers satisfied those needs using information they had obtained and using that information in their decisions. Nevertheless, the decisions regarding that uncollected information (NO answers) are still made in some cases. Through the follow up question it was found that this was then usually done using own experience. For example, the need for optimal use of fertilizer is unfulfilled by the farmers but many do apply fertilizer. In the follow up questions they mentioned making the decision on how much fertilizer to use for their land is using their experience. The decision to optimally use fertilizer is not unfulfilled but the need for that information is. One could say all needs described in this paper are technically fulfilled because they still make the respective decision using own experience. Nonetheless, they do not fulfil the need for- and do not use optimal information in favour of those decisions.

### **4.3.2 Other farmers and family**

With approximately 12% of all farmers using the information from other farmers and family in decision making during the entire process, it is the 3<sup>rd</sup> most relied upon source of information for these smallholder farmers. Farmers go to fellow farmers or family members for advice. A few villages in this sample had a lead farmer living in their community which were a very important and useful information provider for many local farmers. They trusted the information provided by this lead farmer because he or she was 'one of them'.

The cultural aspect of sharing is another explanation for the importance of this source. Sharing experiences and knowledge is very common in these smaller villages in rural areas. This way new information is not only disseminated fairly quickly within a community but is positively assessed as well because of the relationship between provider and recipient.

Of all the farmers that claimed to collect the questioned information, almost 60% fewer farmers relied on 'other farmers and family' for information in the last five stages compared to the first four (see Appendix 4: Figure 12).

### **4.3.3 Input providers**

In this sample, not very many farmers saw the input providers as an important source. Farmers only used this market actor for information in the decision and the input acquiring stage. Even in the latter, were one would think input providers would play an important role and attract information seekers, just over half the farmers mentioned utilizing this source for information.

In this case the relationship between the two actors in the field of information dissemination is very significant. Several farmers did not trust the information supplied by the input providers. There were two information needs solely satisfied by 'input providers', seed and fertilizer prices. Interestingly enough, the farmers do consider collecting information on prices of the two inputs for sesame, however they do not realize the expected knowledge capacity on other relevant information needs. None of the farmers ask about technical issues on fertilizer use and fertilizer quality, while they do ask for the prices (see Appendix 4: Figure 13).

### **4.3.4 Extension officers**

In the case of smallholder farmers in Bangladesh, the Department of Agriculture Extension (DAE) is of major importance. This department of the Ministry of Agriculture has field officers and sub-assistant agriculture officers (SAAO) spread throughout the country and providing relevant agricultural information, free of charge. The DAE is a collaborating partner in the Blue Gold program as well.

The participating farmers did not mention using these officers as sources of information frequently. Only 9,4% of all questioned farmers collected information from these officers, which makes this the least approached and utilized source. The farmers did say they trusted the information provided by the DAE or SAAO officers and they would prefer more contact with them. The main constraint was that the time of these officers is scarce because they are appointed to an entire area with many individual farmers. A few farmers called the extension officers, but they were a minority in this sample (see Appendix 4: Figure 14).

Furthermore, it became clear that the importance of extension officers as sources of information dissolved after the production had come to an end. None of the farmers in the discussion groups mentioned to have received or collected information from DAE/SAAO officers in stages 8 and 9. This is not surprising as this department is mainly responsible for technical agricultural information and not market information. There is a separate department responsible for the market related information and dissemination but none of the farmers were aware of that (more on that department in section 4.5.3).

It was derived from the data that the extension officers do not play a primary role as information providers, even though the farmer would like this to be different.

### **4.3.5 Buyers**

These market actors are, after 'own experience', the most utilized source. They are of significance during the 'input acquiring' stage and are the main providers of information during the 'selling' stage. In the latter, 69,2% of the farmers receive information from the buyers (Table 14 and Appendix: Figure 15). This prominence could be explained by the shortage of governmental support in that stage of the value chain, however this is not a source which is utilized very much in previous stages. In stage 3, farmers received information on seed variety from the buyers. The buyers provided them with information on price differences and general demand of these varieties.

Similar to the input providers, the farmers mentioned distrust towards the buyers. The participants thought buyers would only provide the information which would be for their own benefit and profit, not necessarily the optimal information.

The farmers usually had contact information of buyers or knew someone in their near vicinity with this information. The buyers are the sole source of price information but interestingly enough, when taking the observation on contact information into account, they did not collect the prices before going to the market. They have the means to do so but do not see the relevance of having this information before hand.

#### **4.3.6 Others**

This source option was made to include all other sources which might act as an information provider. After the FGD's it was found that the largest 'other' source were international and national development support programs, such as Blue Gold. Understandably, the farmers were exposed to information provided by Blue Gold, as all the participants were part of WMGs and lived in Blue Gold's working area. Apart from Blue Gold, some farmers mentioned to have received information from Solidaridad, World Fish, BRAC and some smaller local NGO projects.

The second part of this source was dedicated to local and national MFI's. These provided most of the information during the 'saving and credit' stage. Some farmers mentioned they would go to the banks if they needed information, however the majority that did use this source for information said representatives of these local and national MFI's would come to their villages and share the necessary information (see Appendix 4: Figure 16).

The representativeness of the conclusions above, for a larger population can be debated, because of the small sample and the used research methods.

## **4.4 Gaps**

Identifying information gaps in the decision making process of these smallholder sesame farmers can prove to be very useful for the Blue Gold program. The program could use these gaps to narrow down their interventions and focus points. A clear overview of the gaps between the first two steps in the decision and information model would help. By comparing the knowledge and information within the Blue Gold with the information used by the farmer's, one can clearly see some gaps. Moreover, the farmers have directly requested the information in several occasions related to different needs (e.g. optimal fertilizer use). These requests highlight the relevance of the results when considering the general needs of farmers to be the bedrock of development programs. The gaps are defined per stage of the value chain.

#### **Crop Decision:**

- **All the relevant information on the suitable crops for their land.**  
There is quite a large range of suitable crops for the specific land in the Blue Gold polders. The majority of the farmers do not have this knowledge. The ones that do, merely have this awareness but no further information. The participants requested more information on this subject because they would like to compare different crops and choose the most productive and profitable one. The habituated cropping patterns are a large barrier to an eventual adoption. This emphasizes the significance of information on the risks of the suitable crops, besides prices probably the first aspect they consider.

#### **Land preparation:**

- This stage did not show a clear gap. The farmers were using the optimal tillage mechanism and were aware of the optimal times to till. However, several farmers expressed uncertainty about the methods they were using, if it was optimal or not.

#### **Acquiring inputs:**

- **Seed quality**  
The farmers requested more information on the evaluation of seed quality. Currently they all did this using own experience and from some information provided by the input providers.

- **Fertilizer use**

This was according to the participants the most important information need.

- **Fertilizer quality**

The farmers did not consider fertilizer quality or type when making a decision about acquiring this input. They did not express the need for this information, however this is an important aspect of this input.

**Sowing:**

- **Seed rate**

Even though the farmers believed to be using the proper information in the decision about seed rate, this is still an information gap. According to information obtained from Blue Gold, it was clear that they are all using too many seeds per bigga.

- **Various sowing techniques**

Only a few participants were aware of the different sowing techniques and the possible benefits. It must be noted that the ones which knew, all received their information from Blue Gold.

- **Optimal land condition**

At this time the farmers assess this condition using methods based on own experience. They do not seek information on this assessment and condition.

**Cultivation:**

- **Pesticides and Diseases**

In all probability, the small amount of diseases leads to the unfulfilled needs with respect to information on diseases and pesticides. There is a large gap related to this information.

- **Weeding**

Interestingly enough there is an information gap related to weeding. Even though all farmers weed, showing the awareness of its positive effect on production, none could explain why it is beneficial. Of course this provokes the following question: Is it necessary for the farmers to obtain all the information regarding such an activity if they are already making the optimal decision? However, that does not omit the information gap.

**Harvest and post-harvest:**

- In general, no clear information gap. Most farmers were using the most appropriate information when deciding on post-harvest activities. They were aware of the negative impact moisture can have on sesame's quality and used some good techniques to prevent that (e.g. blue plastic nets, drying on wooden floor). However, they still doubt their methods and techniques. This also holds for information on storage methods.

**Storage:**

- **Annual and seasonal price changes and its drivers**

The information gap created a need in this case as well. Some farmers knew, from experience, when prices should be higher and lower during the year but did not understand why. The majority did not know timely enough when and how the prices changed. Also applies for the selling stage.

**Selling:**

- **Sesame quality**

Similar to the gap encountered during the 'acquiring inputs' stage with the seed quality. Farmers, again, base it on own experience and learn from buyers, however they are not satisfied with the information they use and request more on the assessment of quality and the relations with price. Furthermore, disputes with buyers about quality and price could be resolved if some sort of objective standard was set. This would imply collaboration from the private and public sector when setting such standards.

- **Sesame prices**

The information gap arises regarding the acquirement of prices. Many farmers mentioned that they do not collect prices before going to the market. The majority does have the contact information, meaning accessibility is generally speaking not the problem.

**Saving and Credit:**

- The gap in this stage is not so much related to information. Farmers that use these financial services know where to get the information. The other farmers are not in a financial situation which affords saving or credit, or think they are not eligible for these services. The gap appears in the second scenario. It is more of a perception gap, where the farmers do not think they can use these services, than an information gap.

## **4.5 Information dissemination Systems**

Besides the identification and analysis of the information needs, this paper investigated five different information dissemination platforms and tools which could play a role in the decision making process of the smallholder sesame farmers of South West Bangladesh. The platforms are not among the accessed sources of the farmers in the sample but have the capacity and knowledge to be useful for the farmers. This early and brief analysis of the tools could support Blue Gold in their assessment.

It is interesting to see how many information services have been developed, in Bangladesh, to disclose small rural farmer's relevant agricultural information. From mobile services and applications to call centres to printed information to low tier information centres. However, this study has not found much evidence to support the success and effectiveness of these exogenous platforms and tools. In this section a few platforms and tools were analyzed through interviews with involved parties. The structure and activities are discussed, along with some opportunities for Blue Gold. More on the latter in section 5.3.

### **4.5.1 Union Digital Centres (UDC)**

Union Councils, or locally called Union Parishads, are the lowest tier of local government in Bangladesh. There are approximately 4550 Union Parishads throughout the entire country. In the research paper 3 of these local government offices<sup>11</sup> were visited to get a good understanding of their activities and possible role as provider of agriculture information. In 2009 the Government of Bangladesh started a country wide project to include digital information centres into these Union Parishads as part of the Access to Information program (a2i). Nowadays every Union Parishad has its own UDC (GoB, 2013).

#### *Structure*

As mentioned above, these information centres are included in every Union Parishad through the country. The primary objective is to assist citizens with available digital services. This includes mainly administrative services such as printing, emailing, searching the web, job applications, exam results etc. This however usually does not include agriculture information.

Every UDC is run by 2 entrepreneurs, one male and one female, however in practice this is not always the case. These entrepreneurs get training from the government to be able to fully assist the citizens with their digital information needs.

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<sup>11</sup> In the Gutudia, Deluti and Batiaghata Unions Parishads

### *Activities*

During the interviews, the entrepreneurs were asked for an estimate of information offered with respect to administrative and agriculture information. All three came with similar ratios of approximately 90%/10%, respectively. This notion of the small importance of agriculture information was earlier found in a research done by Katalyst (Katalyst, 2014). They explained this skewed bias towards administrative services because of the paid structure with which the UDC's work. The entrepreneurs can charge the citizens and farmers for administrative services but the agricultural services and information is offered for free. Resulting in an evident incentive and emphasis on administrative services, rather than agriculture information/services.

The interviewed entrepreneurs mentioned they would redirect the farmers to the DAE/SAAO officer which also has an office in the same Union Parishad. The problem here is the limited office time of these officers, they spend most of their day in the field assisting farmers.

Finally, the UDC's have a 'Public Private Partnership (PPP)' strategy with several large commercial companies and banks. This was also mentioned in the interviews. This strategy usually results in the entrepreneurs having online accounts of these companies and banks through which they can offer digital services. The private companies and banks pay the entrepreneurs a small fee every time services are offered through that account. These services include online money transfers, mobile credit services and selling products through web shops.

### *Interventions*

Katalyst, a market development program, has already launched a project pilot with the objective to provide relevant agriculture information through the UDCs and make these centres a reliable source of information for the farmers. The interventions focus on information regarding pesticides, production techniques, fertilizer solution, and poultry.

An interview was held with a project manager of the implementing company, Enroute. In this interview it was found that there were some interventions being performed in the Northern part of Bangladesh, namely the Rangpur region. These interventions included 50 UDC's and all their entrepreneurs. Katalyst offered a capacity building training for the participating entrepreneurs: a four day training on agricultural background and use of the relevant websites.

Furthermore they will have several promotional events in various Unions to attract the attention of local farmers, provide information on the interventions and its changes and explain the opportunities and benefits through entertainment. Katalyst is planning to expand this project in March or April if the pilot was a success. According to the project manager of Enroute, a detailed and incentivizing revenue model for these services and centres was the largest constraint of the primary objective.

The UDC's were chosen because of the strong internal networks and large awareness of these centres which exist within the rural communities. These networks are utilized for various services and information, but not including agricultural information. The problem is two sided, the UDCs do not yet have the full capacity to serve as a reliable source and the farmers are not aware of these services yet.



#### 4.5.2 Agriculture Information Service (AIS) and Agriculture Information Communication Centres (AICC)

The Agriculture Information Service is an independent department of the Ministry of Agriculture in Bangladesh. It is responsible for the dissemination of all agricultural information from every agricultural department. For this research the Khulna Divisional Head Office was visited and an interview was held with the Regional Farm Broadcasting Officer.

The Khulna office is responsible for 12 districts surrounding Khulna. They disseminate agricultural information through three main channels:

- **Print:** booklets, leaflets and posters containing various topics. Besides, the farmers can subscribe for a monthly bulletin for 50 Taka a year.
- **Electronic:** disseminate information through daily educational (national) **television** programs and several national and regional **radio** programs. Furthermore they have a national **call centre** located in Dhaka where farmers can retrieve agriculture information on working days (Sun-Thurs) from 9am to 5pm.
- **ICT:** through this channel AIS has set up Agriculture Information Communication Centres (AICC).

##### *AICC*

The following information was collected through the interview at the Divisional Head office and an interview at an AICC.

To this day AIS has set up 245 AICCs spread out through the whole country. The government has a plan to expand in 2016 after the success of the existing centres. In the Khulna division 5 AICCs have been set up in the following districts:

- Rupsa
- Phultala
- Batiaghata
- Paikgachha
- Dumuria

##### *AICC structure*

All the AICC's are managed by the division offices. Farmers can collect agricultural information and share it with others. The centres are run by two designated farmers which assist farmers with their agricultural problems and questions. These farmers receive their information mostly through the AIS website which is updated using DAE information.

The AICC's are open every day after 5pm. The designated farmers are trained in Dhaka and have to deliver monthly progress reports to the division office.

These centres work with a similar revenue model as the UDC's. The designated farmers have to offer the agriculture information for free but can earn money by offering additional administrative services. This way the AIS give farmers more incentive to work for the AICC's. Services include, taking pictures of their activities and uploading them to the AIS website, collecting information on the centres activities and compile this.

However, according to the Regional Farm Broadcasting Officer this was also the creator of the largest problem of these centres, similar to problem in the UDC's. He mentioned that farmers want to earn something for their time spent in those centres. He was afraid this could lead to the neglect of the main objective/service, disseminating agricultural information, and the focus on the paid services. The farmer running one of these AICC's in Batiaghata mentioned the service distribution between administrative and agriculture services he offered was approximately 50-50.

### 4.5.3 Department of Agriculture Marketing

As the final information dissemination platform, this paper investigated the activities and information capacity of the Department of Agriculture Marketing (DAM) to see if they could be of use to the smallholder farmers and how.

As mentioned before, the government is quite involved in the field of agriculture and focuses mainly on the production process. Hereafter, the department designated to gather and process all types of market information which is relevant for agents in the agricultural sector should also assist the farmers with all their market information needs. However, this was not the case for the farmers from this sample. None of them had heard of the DAM and were fully unaware of their activities. Through an interview with Mr. Kabir, the Deputy Chief of Planning and Development, the following activities of the DAM were brought to light.

#### *Activities<sup>12</sup>*

At the moment the DAM only collect price information now, due to a lack of resources and capacity. The price information is collected in all major markets for the selected commodities.

At the district offices, a District Market Officer collects the information from the different designated markets in that area. The Market Regulation Act was set up to determine the designated markets for the collection of information. The market is notified and has to take a license at a nominal fee (400-500 Taka). These markets are run by Market Committees which include a representative of DAE and DAM.

Three types of market prices are collected:

- **Growers price (farm gate price):** Collected and compiled twice a month and published on the DAM website.
- **Wholesale price:** Collected on a weekly basis, compiled and made public. 230 commodity prices.
- **Retail price:** Collected and published on a daily basis. 60 commodity prices.

For the smallholder farmer in the rural areas access to this information is very difficult, which explains the unawareness of the activities and facilities of this department. DAM officers do not go into the field to disseminate the market information. The interviewed official stated that the farmers could easily collect the necessary price information through the website or by visiting the district offices. The problem in this sample, and probably in many cases, is the limited access to internet and the costly, time consuming trip to the district office which they are not willing to make. Besides, these farmers collect price information directly from the buyers and have shown no interest to have other market level prices.

There are possibly some opportunities for Blue Gold with respect to the various facilities set up by the DAM, however this was not part of scope of this research.

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<sup>12</sup> DAM has set up several market based infrastructures as well. For more information on these infrastructures see Appendix 4: Table 24.

#### **4.5.4 Smart phone & Community Radio**

On a more general note, this paper conducted a small survey on the use of smart phone and (community) radio. In this survey, 446 farmers from polders 30 and 22 were asked a few simple questions about their use of smart phones and radio. If Blue Gold is considering to apply such information dissemination tools, it is important to have an initial understanding of the current usage of such tools. These results could assist Blue Gold in this initial assessment. It has to be stated that this survey includes a small sample in a relatively small region of Blue Gold's total working area. Not necessarily representative for farmers in general.

##### *Smart phone*

The mobile revolution has also hit Bangladesh and will probably rapidly expand horizontally through different sectors and vertically through every level of the population. As of August 2015, Bangladesh has approximately 126.87 million mobile phone subscribers (CNA, 2015). However, smart phones were estimated to only account for 16% of all mobile sales in 2014. However, the market share of smart phones is increasing, possibly due to the tremendous increase in market share of the local mobile phone provider, Symphony, and there cheap and available smart phones (Waring, 2015).

The survey conducted for this research found approximately 16% of the questioned farmers owned a smart phone and 40% had a family member with a smart phone. The farmers used mobile phones, in general, mostly to phone others, listen to music and view videos. This survey shows that a small portion of the farmers own a smart phone, but a far larger group has a family member with one.

##### *Community radio*

Within Blue Gold there were some staff member looking into the opportunities of community radio for the farmers in the working area. Two community radio stations operate in, and have coverage over, the Blue Gold area. To assist the assessment of these opportunities a few question in this survey were dedicated to the use of radio.

Only 12% mentioned listening to the radio and none of the questioned farmers were aware of community radio stations in their area. The ones that did, mostly listened to the news and music. In the entire data set, only 7 farmers mentioned listening to educational programs. Finally, the majority (83%) of the listeners only listened in the evening.

#### **4.5.5 Trainer in the Pocket**

The Trainer in the Pocket concept is successfully used as an information dissemination tool by the DFID funded program, English in Action (EiA). This project works with teachers and students to increase the level of English skills among both groups.

The essentials of this concept are a mobile phone (smart or dumb phone) which can harbour a SD card, a SD card filled with training material in audio and video form and a portable speaker.

EiA utilizes this concept with the following objectives:

- Improve the English skills of the teachers,
- Enhancing the educators teaching capacity through new methods and techniques,
- Improve the English skills of the students.

##### *Structure*

In the interview with Mr. Sarkar, the Head of Materials Development of the EiA program, the concept was explained. EiA develops audio and video materials, for different modules. Each module has its own objective and target group (i.e. capacity building, classroom material etc.). This material is uploaded onto the SD card and provided to the teachers together with a portable speaker.

Subsequently, the teachers can now use this material in class and for their own education and capacity building. Furthermore, the materials are being embedded in the educational system of the government to reach more people that are enclosed from the English in Action program.

Mr. Sarkar mentioned that a reason for the immense popularity among teachers is related to the fact that the teachers are able to use it at their own convenience, using their own mobile phone and the portable speaker. He believes this concept could work for the Blue Gold target population and objectives as well. Structurally, the implementation of the concept and the Blue Gold program are very alike.

For example:

<b>Trainer in the Pocket</b>	<b>Blue Gold Program</b>
Works closely together with the Ministry of Education, uses government guidelines as framework for material and embeds the material in education system. Furthermore they work with educational officers in the field: monitoring role. These officers can be used to monitor the progress and use of the materials disseminated by the program.	Works closely with the DAE and its extension officers (e.g. also starting to involve DAE/SAAO officers in the MFS related activities). DAE is endowed with an enormous source of information and the extension officers work on the same level as the farmer already. Such a concept could be another way to increase the interaction between low tier DAE officers and farmers
Incentivizes teachers to share experiences and knowledge with each other.	Horizontal learning (similar philosophy) is very important in the Blue Gold program
Uses experienced teachers as facilitation teachers to train other teachers	Such 'leader' also exists here, in the form of lead farmers. These individuals are highly respected and seen as source of information.

When asked about the limitations of this concept, Mr. Sarkar mentioned some limitations on the user end. Not all participants were familiar or owned a mobile phone.

The most resource intensive part of this concept is the material development. Not all material is apt for this form of information dissemination because it is updated very frequently. This would be a problem when using fixed materials on a SD card. If this concept were to be incorporated in the Blue Gold program, the first necessity would be to define the materials which could be disseminated using this tool.

## 5 Recommendations

The primary objective of this research was to identify the information needs of smallholder sesame farmers in the working area of Blue Gold. This was done for the program as a whole, and specifically for the market and agriculture development components. The results of this research were, to many, not surprising or considerably new. However, there was a need for a clear and bundled overview of this topic. In this section some recommendations for Blue Gold and further research are shared.

### 5.1 Information needs

The importance of a sound understanding of the information needs of the targeted population in a development program is very significant. Objectively, these needs stand at the basis of all activities and interventions created by such programs. At the end of the day, the target population, farmers in this case, need to benefit from the activities to which they are subjected.

The results of this research could help the Blue Gold program to tune their objectives to the needs of the farmers. Furthermore, it could help specify the targeted activities to satisfy the specific needs, expressed by the farmers. Finally, for future value chain analysis it could benefit Blue Gold to adopt and include the methodology of the FGD's, or certain aspects, to clearly identify needs.

Regarding information needs Blue Gold could assist the farmer, using the results of this study, in the following ways:

#### **Provide the relevant information to close the identified gaps (see section 4.4),**

This holds for the obvious and requested needs such as information on fertilizer use, suitable crops and seed/sesame quality assessment. In contrast, this is also applicable for the information for which they have not yet established a need. In most cases, this is because they do not see the relevance of this information.

#### **Assess the information they utilize using the results from section 4.2.**

With respect to the information needs in this paper, it is recommended to take the classification of consciousness into account. Concentrating on the needs within these classification separately, when assisting the farmers, could lead to a more efficient fulfilment, which would be beneficial for both the farmers and Blue Gold.

This assessment and possible intervention implication would be different for the three levels of consciousness, specifically for the subconscious and unconscious needs.

#### *Subconscious*

In case farmers are satisfying the information needs with the correct and optimal information, it is important to confirm that thought and eliminate possible doubt. This could help in the horizontal learning line of thought by increasing the set of information and its certainty. This certainty can be shared with others if the farmers are more comfortable and confident about the information they are using, assuming horizontal learning is applied. On the other hand, if farmers are using inappropriate information in their decisions the uncertainty can be used in the advantage of, for example, an intervention because the farmers are more open to new information and change regarding the fulfilment of these needs. Theoretically, this would lead to a less demanding and resource intensive intervention.

#### *Unconscious*

For the unconscious needs it is important to first create awareness of the importance of these needs. This will be more resource intensive than the previously mentioned subconscious needs, because Blue Gold has to start from scratch.

### **Point the farmers in the right direction as to where they can obtain the optimal information.**

A general observation was made regarding the information seeking behaviour of the examined farmers. Through the analysis of the utilized sources it became clear that the majority of the information obtained from sources, other than their own experience, was provided to them by other market actors. For the conscious information needs this was evidently not the case, because they were aware that such information was important for them. However, for the information needs where this awareness was limited<sup>13</sup>, the participants did not show much initiative in their seeking behaviour for new information. This is probably related to the fact that they do not know which source could help them with those needs. Blue Gold could take on the role of broker to connect both provider and recipient and generate the initial exposure. This way both the need can be fulfilled and the behaviour to actively seek information will be rewarded.

### **Blue Gold's role**

Blue Gold should play a pro active role as a catalyst of this critical awareness. Optimally, farmers should consider their information needs, the relevant sources, the corresponding costs and the value of the information. Through this argued assessment they should identify the relevant information, necessary for their decisions (Kadlec, 1985; US North Central Regional Research in Farm Information Systems, 1994). They should understand why they make the decisions they make, the reason behind the fulfilment of information needs and the usefulness of sources. If this awareness is created and an attitude towards information seeking is enhanced, it could increase the level of independence among farmers. This can be done through the sessions conducted by the field staff or through larger organized training sessions with outside parties, public and private. The only way farmers will change their culturally determined habituated decision making process and information need fulfilment, is if they understand the importance of knowing why they do things the way they do. Blue Gold should stimulate the farmers in creating this awareness using its human capital (field staff which are recognized and respected) and networks with the public and private sector. Additionally, Blue Gold can build on the existing trust which is expressed towards the information offered by extension officers. The problem with the publicly provided extension services is that they lack the means to be evenly and extensively available to all farmers. On the other hand, the private sector deals with opposite strengths and weaknesses. They lack the trust of the target group but have the capacity to reach them. Blue Gold could combine these traits in their training and demonstration programs. Furthermore, it could include both parties in some of the information dissemination systems. For example in the AICC's, the private sector could provide information and assist in the dissemination materials while the 'face' of the centres remains the trusted public sector operators. Such a public-private partnership could also be beneficial in the Trainer in the Pocket concept. Public extension officers could assist in training the farmers with the usage and the input could be jointly provided by both public and private parties. Blue Gold should capitalize both strengths and make them complements in the network of the farmers.

## **5.2 Networks**

The initial need of the farmers is for information, but with the exit strategy in mind it is as important to make the information provision from the various sources to the farmers sustainable and reducing the facilitating role of Blue Gold. To eventually reach a sustainable level of continued information flows to and from the farmers it is essential to enhance the appropriate linkages, the network. Seen as Blue Gold initially works from a bottom up perspective, it is recommended to (besides playing the role of information provider) include the importance of networks in their program. More concretely, develop an additional program to stimulate this awareness of networks and networking, and show farmers the benefits of utilizing such a network. Make it clear to the farmers that Blue Gold will eventually leave and so will the direct provision of information from Blue Gold to the farmers.

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<sup>13</sup> I.e. the subconscious and unconscious information needs such as seed and sesame quality, fertilizer use and quality, information on other crops.

However, that does not mean the information needs simultaneously end as well. As mentioned in the introduction, the networks can carry the sustainability of the work done by Blue Gold. Many of the information dissemination done by Blue Gold is in collaboration with the public and private sector or can be substituted by them. There is willingness to increase the role of other information providers, as it would be in favour of all parties. For example, the demonstrations on polder level. The most effective way of transferring technical information and increasing the adaptation rate is to literally show the farmers the methods and techniques through demonstrations (i.e. give them proof of success and increase their perceptions of the marginal gains). The private sector is willing to assist in these activities in collaboration with the DAE.

The network of a farmer is currently very faint, mainly because of the use of own experience and the negative attitude towards searching information when needed. Blue Gold should take an active role in enhancing these networks, while facilitating educational and awareness training for the farmers about these networks.

From the experiences with the FGDs in the field, it is recommended to include participatory visual methods (e.g. diagramming or drawing networks) when defining the current networks in terms of the farmers' perception. Similarly to analysis of the information needs, Blue Gold could then find weak spots in the networks and focus on those. Several studies done on research techniques have supported these methods and confirm their effectiveness (Pain & Francis, 2003).

Finally, the Resource Farmer (RF) could play a distinct role in the network of the individual farmer and should be defined. Many agricultural or market related information needs are similar if not identical for most farmers. In every MFS an individual has the role of lead farmer of a producer group. These individual farmers are highly relied upon and trusted by the surrounding farmers which make them good access points for new information. Assuming some of the information needs are similar, it could be more efficient to make the RF a central player in obtaining that information and spreading it with his/her fellow farmers. Thus making the networks of RF's key actors in the networks of individual farmers. In this case the networks of the individual farmers do not have to be very extensive and complicated. Furthermore, it would be more efficient for Blue Gold to enhance and set up a few networks with RF's, through which they reach a far larger group, than to focus on every individual network.

Examples of information needs which could flow through RF's:

- Fertilizer use
- Seed rates
- Optimal land condition
- Sowing techniques
- Annual and seasonal price changes and its drivers
- Post harvest activities

### **5.3 Information Dissemination Systems**

For the examined information and dissemination platforms and tools the following recommendations are made. The information dissemination services could all play a role in the network of smallholder farmers. Important is to first realize awareness and show the marginal gain.

#### **Union Digital Centres**

The main recommendation for these centres is to follow the interventions implemented by Katalyst. Although these interventions are not carried out in Blue Gold working area at the moment, it is wise to follow them. They are planning to expand if the previous interventions are a success. By following the progress Blue Gold can be ready to include these new services in their program once they are implemented in relevant areas.

## **AIS/AICC**

The AIS possesses a large body of agricultural information and disseminates it through various channels. Incorporating this information and their services in the network of the farmers will increase the access to valuable information. Furthermore, it is interesting to follow the developments of the AICC's. Even though there are only a few in working area of Blue Gold, it is worth looking into and if possible including these as sources of information for the farmers in those areas. The AICC's apply an interesting local strategy which shows potential as a reliable source.

Moreover, according to the observations there is quite some potential for Public Private Partnerships. The AICC's are currently not working with private companies in fear of discrimination. It could be possible to find willing companies to invest in these centres if they see the mutual benefits. This would strengthen the information provision in the local areas as it comes from several parties, once the awareness is created.

## **Trainer in the pocket**

This concept is believed to have some very positive prospects for Blue Gold. First of all, the concept with low investment. It could fit in the horizontal learning line of thought, if applied to the resource farmers. Furthermore, the costs of a speaker can be excluded if the materials are disseminated through the resource farmers.

Possible implementation of this concept could take the following simple form (example):

- First, and most crucial, step would be to develop relevant, useful and most of all thoroughly elaborated material. The limitation to this concept is that once the SD cards are distributed, updating the material will become time and cost intensive.
- RF's receive training in how to use these SD cards and how to disseminate the information.
- Sessions are set up to share the material with fellow farmers, conducted by RF's and initially with the help of field staff.

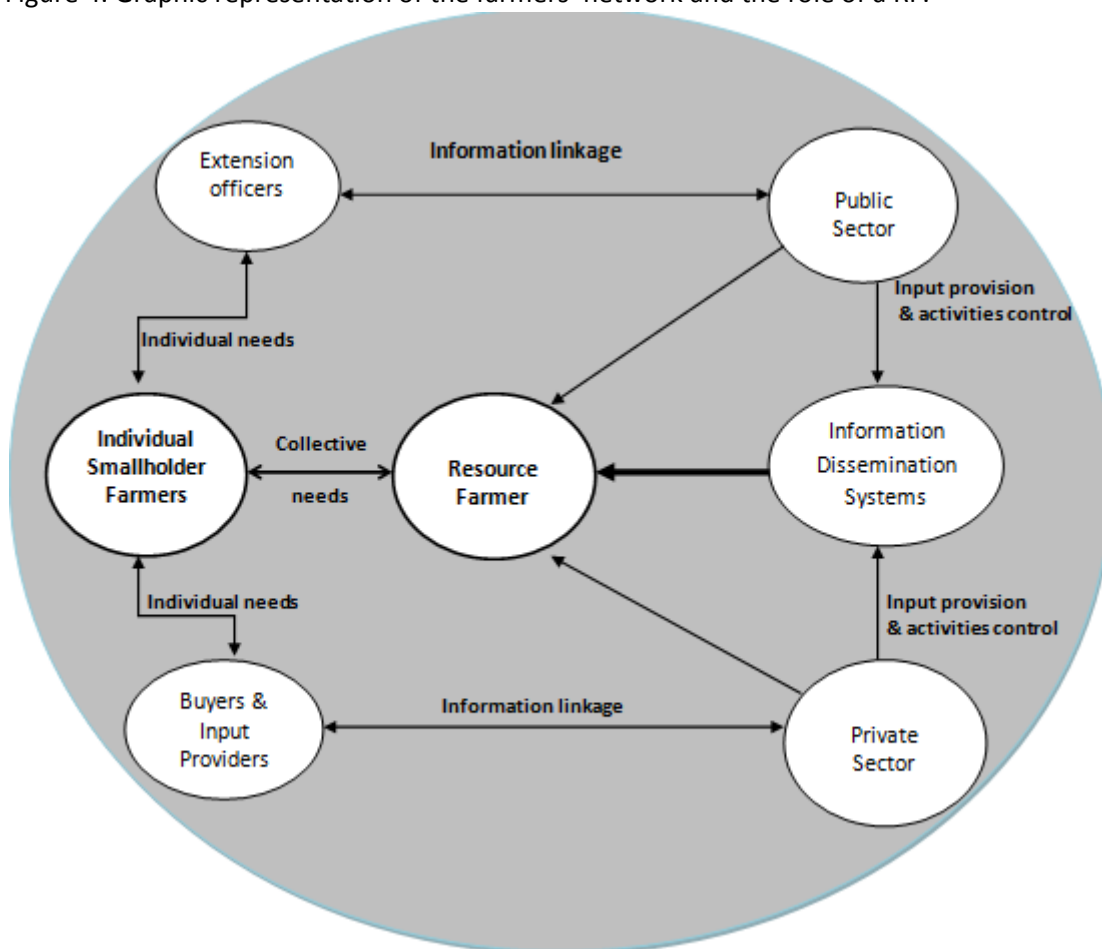
Secondly, the uncanny resemblance in the implementation of the concept and Blue Gold activities give the impression that adoption could be successful. If it is considered, it would only be in the benefit of Blue Gold to consult EIA about possible limitations, failures and developments as they have the resources and experience. Finally, the results of this research could assist in the creation of material by linking them to important information needs expressed by the farmers. Material could be related to following information needs:

- Seed and sesame quality
- Savings and credit system
- Sowing techniques
- Fertilizer use
- Drivers of price changes
- Information on suitable crop



The figure below shows a graphic representation of the recommendations above. It depicts the network of individual farmers and the roles played by the different stakeholders in the market. Moreover, the different linkages between the various market actors are defined. The gray background represents Blue Gold. Blue Gold oversees several interactions within this network and the programs' activities are directly associated with the linkages and coordination between different stakeholders. The line between the information dissemination and the resource farmers is thicker than the information provision from both the private and public sector to the RF's because of the potential for combined utilization of the advantages of both sectors (i.e. trust and capacity). Combined public-private influence could lead to more efficient information provision compared to individual provision from both sectors.

Figure 4. Graphic representation of the farmers' network and the role of a RF.



## 5.4 Further research

Some recommendations can be made for further research into this field of study. First of all, it was found that, even though sesame is fully market oriented, it is not ideal when wanting to investigate the role of economic markets and the effect it has on farmer's networks. This was mainly due to the fact that sesame has relatively little inputs, which means less involved market actors.

Furthermore it can always support the conclusions if a larger sample size is used, to make the results, recommendations and conclusions more representative.

Finally, it may be interesting to focus more on the networks themselves in further research. This includes the knowledge of farmers about networks in general and the benefits of networking. This is in line with some of the 'Blue Gold specific' recommendations as a better understanding of such aspects of local agriculture economies could benefit the program as a whole.

## **6 Conclusion**

### **6.1 Information needs**

Using qualitative methods this paper has built up an overview of the information needs of smallholder sesame farmers in South West Bangladesh. All the different information needs were identified in the nine steps during the entire value chain. Fertilizer use and post-harvest methods and techniques were the most requested information needs according to the farmers in the sample. Regarding the classification on the level of consciousness, it was found that the farmers are conscious about the importance of the information in the majority of the information needs. However, the information used in these conscious needs was doubted in many cases (i.e. if the information used results in an 'optimal' decision). These needs were classified as subconscious information needs. There are three levels of subconscious needs; confirmation, doubt and lack. With respect to sources, it was very clear that the majority of the farmers utilize their own experience most decisions in the value chain. This can be explained by cultural aspects and because of the lack of available information. The latter is exacerbated by the weak attitude towards seeking information.

### **6.2 Networks**

This paper recommends the Blue Gold program to not only take on the role of information facilitator with respect to the information needs, but also stimulate and catalyze the critical awareness and positive attitude towards seeking information. Moreover, it would benefit the program, steering towards its exit strategy, by including the aspect of networks and networking in their business and agriculture components. Defining the various roles of sources in such networks and how it can benefit the farmers in the long run. Keeping in mind that farmers will only collect information and apply it in their decisions if the marginal gains are higher than the costs of utilization.

### **6.3 Information dissemination systems**

After discussing and analyzing the different activities and structural aspects of several information dissemination systems, some of the systems showed promising opportunities while others were currently less useful for the sesame farmers. Both the AICC's of the AIS and the Trainer in the Pocket concepts showed much interesting opportunities for Blue Gold to intervene. Furthermore, both these systems have the potential to include several market actors, public and private, to contribute to the sustainable exit strategy of Blue Gold.

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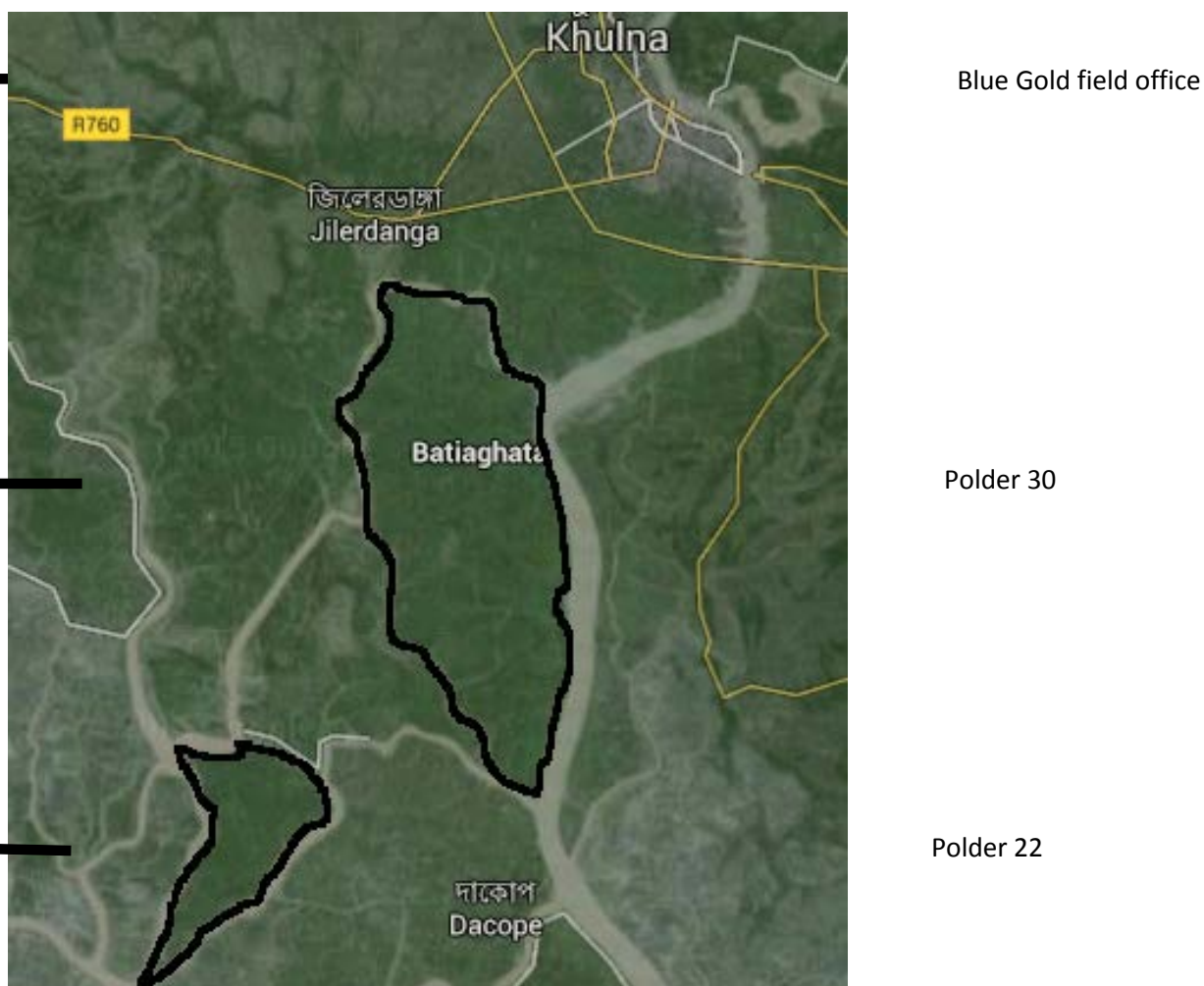
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## Appendix 1. Focus Group Discussion Specifics

Figure 5. Polders 30 and 22 and Blue Gold Field office.

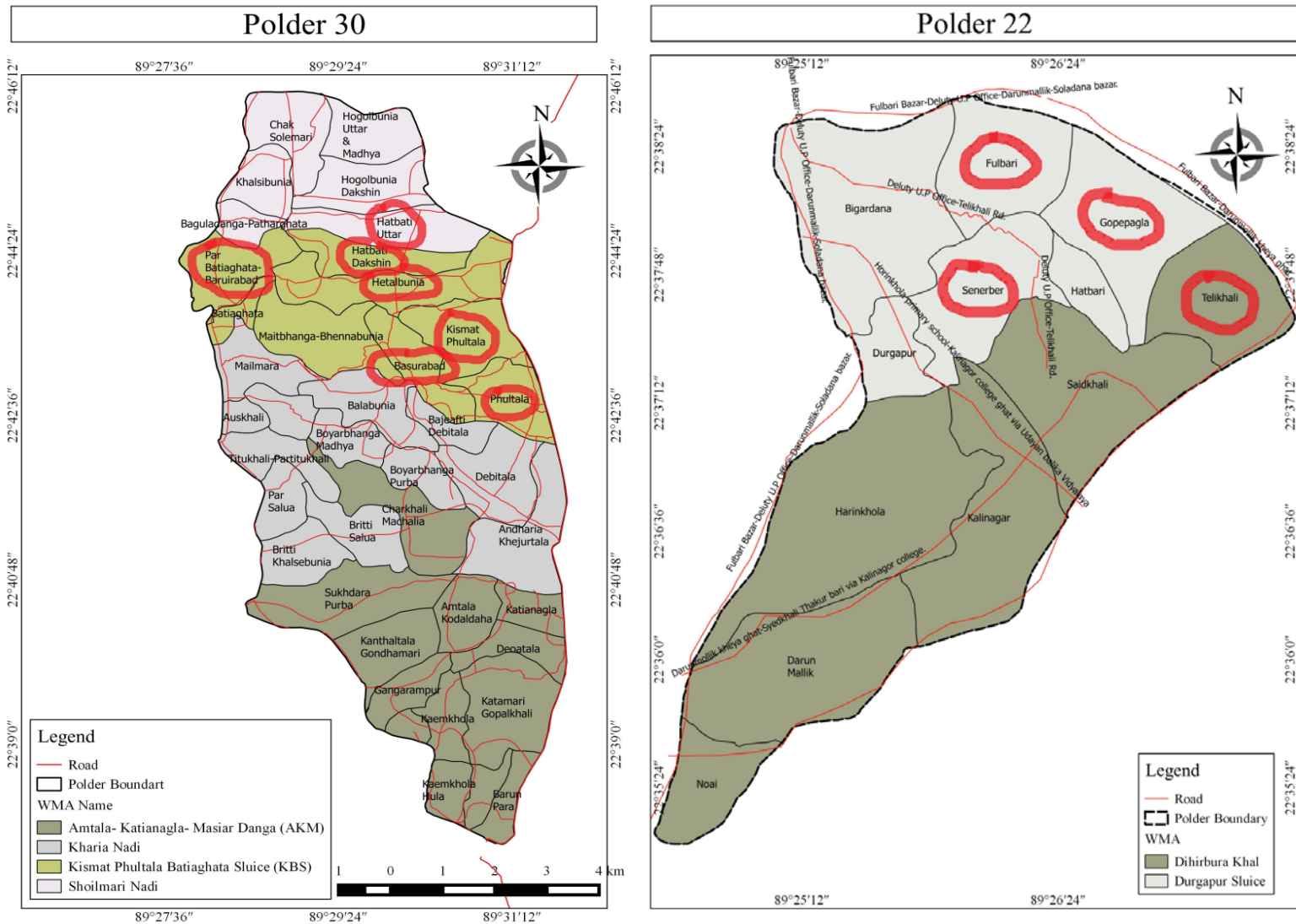


Source: Google Earth

Table 15. FGD specifics

Polder 30				Polder 22			
Village	Date	Male	Female	Village	Date	Male	Female
Bashurabad	09-12-2015	8	5	Gopipagla	14-12-2015	10	6
Hatbati Dokkhin	09-12-2015	7	7	Fulbari	15-12-2015	7	7
Phultala	10-12-2015	4	11	Senerber (MFS)	15-12-2015	6	8
Par Batiaghata	10-12-2015	7	9	Telikhali	19-12-2015	10	4
Kismat Phultala	19-12-2015	6	7				
Hatbati Uttar	20-12-2015	8	7				
Hetalbunia	20-12-2015	5	6				

**Figure 6. FGD locations in Polder 30 and 2**



**Figure 7. MFS explanation**

MFS is a unique approach designed by Blue Gold to achieve its objective of increasing income and reducing poverty of beneficiaries by improving agricultural productivity and linking them with market systems. MFS is conceptually derived from the traditional Farmer Field School (FFS) approach but its scope is wider. MFS helps a farmer to look beyond increasing production to the profit and profitability of his/her crop in consideration of the risks involved. MFS seeks to facilitate market linkages and therefore enhances the farmers' understanding of the market system and the expansion of their network of market actors for inputs, technology, market info and finance. Overall, MFS strengthens a farmer's market orientation based on better informed decision making related to the cultivation, marketing and financial aspects of his crop production. In the process it is also envisaged that the members of the MFS producer groups will incubate collective actions and nurse entrepreneurial skills that will lead to more agricultural business.

Source: Blue Gold article, <http://bluegoldbd.org/vctraining-producer-group/>

**Table 16. Focus Group Discussion questions**

1. Do you collect information on which crops grows well on your land?	
2. Do you know the different sowing dates of the crops?	
3. Do you know how to prepare your land for the different crops?	
4. Do you know what you earn from the different available crops?	
5. Do you know the costs for the different crops?	
<hr/>	
6. Do you know the optimal number of times to till your land for sesame?	
7. Do you know what tillage mechanism is most suitable for sesame production?	
8. Do you collect information on seed prices?	
9. Do you collect and use information on the quality of the seeds you buy?	
10. Brown or Black, do you collect information which variety is good?	
11. Do you collect fertilizer price information?	
12. Do you know, for sesame production, how much fertilizer you should apply?	
13. Do you collect information which fertilizer is good or bad?	
14. Do you know how many seeds you need for 1 bigga (bigga in polder 30 = 50 decimal)?	
<hr/>	
15. What is the ideal condition of land which is suitable for the sesame seed sowing, do you collect this information?	
16. Do you collect information on different sowing techniques, broadcasting and others?	
17. Do you collect information on pesticides and diseases?	
18. Do you collect information for sesame, how and why weeding is needed?	
19. Do you collect information how to properly stack sesame after harvest?	
20. Do you use water on you stack of sesame?	
21. Do you know why sesame drying is important?	
22. Do you collect information how to properly dry sesame?	
23. Do you know why cleaning sesame is important?	
24. Do you collect information how to properly clean sesame?	
25. Do you collect information how to properly store sesame after cleaning/drying?	
<hr/>	
26. Do you collect information on when sesame prices are high vs. low?	
27. Do you know why prices go up and why they go down?	
28. Do you collect information on the selling price of sesame?	
29. Do you collect sesame prices from different buyers/markets to compare with each other? *	
30. Do you know when demand for sesame is high and when it is low during the year?	
31. Do you collect information on quality of sesame, what is good and bad quality?	
32. Do you collect information on where you can save money and the interest rates?	
33. Do you know where you apply for loans and against what interest rate?	
34. Do you collect information on the investment you have to make for the next crop?	

\*no source of info

**Q. 1-5** -> General part. This is the period when they choose the crops they will cultivate on the land and the information they use to make this choice (in practice -> often not a choice, more of a habit, passed on from generation to generation and following other farmers)

**Q. 6-14**-> From this point forward it is specifically linked to sesame. These questions are related to the pre-production activities they have to decide on such as tillage and inputs.

**Q. 15-25** -> These question involve the decisions that are made during production, harvest and post-harvest.

**Q. 26-34** -> After harvest and storage they start making decisions about sales, these questions include information used in those decisions.

**Table 17. Follow up questions FGD**

Q.1	Which crops (expect rice and sesame)?
Q. 6	How many times do you till the land? 3 or more is optimal
Q. 7	<b>What do you till with?</b> Tractor -> wrong info, power tiller -> right info
Q.8	Do you collect the prices before you buy them or get them at the market/input provider?
Q.10	Which do you cultivate, which one is better and why?
Q.11,12,13	Do you use fertilizer when cultivating sesame?
Q. 14	How many seeds do you use?
Q. 15	Can you explain when the land is in good condition to sow sesame? And how you assess the condition?
Q. 17	Do you use pesticides?
Q. 18	Do you weed?
Q. 19	<b>If yes, how do you stack it?</b> On the soil -> wrong info. On packa floor, blue nets, plastic sheet etc. -> right information.
Q. 21	If yes, why do you think this is important and then source?
Q. 22	<b>How do you dry sesame?</b> Blue nets or packa floor-> right info if muddy floor -> wrong info
Q. 23	If yes, why do you think this is important and then source?
Q. 24	<b>How do you clean sesame ?</b> Shaking and remove leaves mud/soil-> right info -> if they keep leaves grass mud etc. -> wrong info
Q. 25	<b>Where and how do you store your sesame?</b> Muddy floor -> wrong info -> plastic bag, dry place, wood or floor -> right info
Q. 27	If yes, what drives these price changes?
Q. 28	Do you collect prices before you go to the market and sell or do you get them when you come to the market directly from the buyers?
Q. 32-33	Do the banks come to the polders to provide the information or do you go to the banks to receive it?

**Table 18. FGD question per stage**

Stage 1	Q. 1, 2, 3, 4, 5
Stage 2	Q. 6, 7
Stage 3	Q. 8, 9, 10, 11, 12, 13
Stage 4	Q. 14, 15, 16
Stage 5	Q. 17, 18
Stage 6	Q. 19, 20, 21, 22, 23, 24
Stage 7	Q. 25
Stage 8	Q. 26, 27, 28, 29, 30, 31
Stage 9	Q. 32, 33, 34



Figure 8. Photographs of FGDs, exercises 1 and 2



## Appendix 2. Decision and information model

Figure 9. Step 1 and 2 Decision and Information model

### Sesame Farmers' Decision Stages and Information Needs along their Value Chain (STEP 1 & 2)

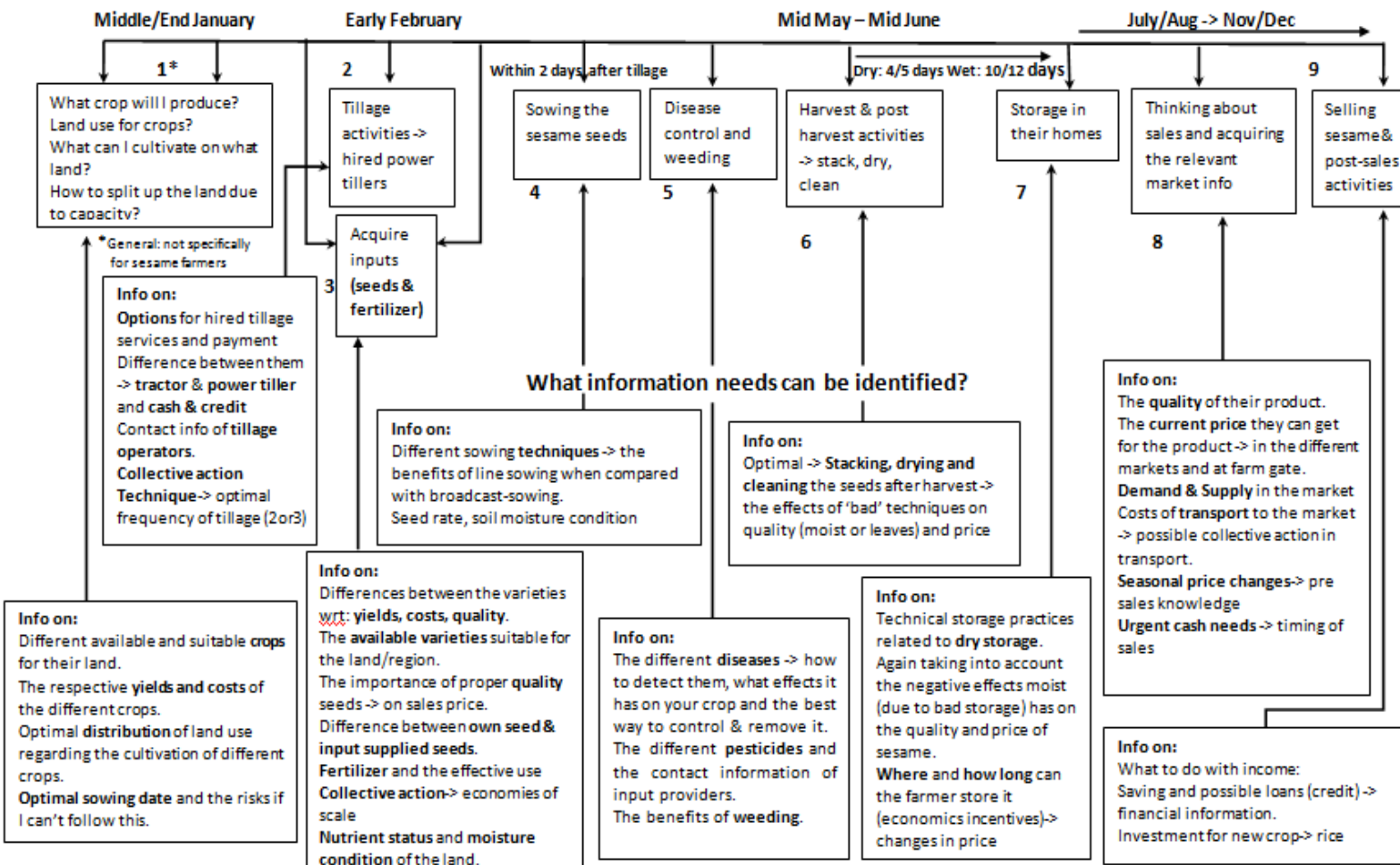
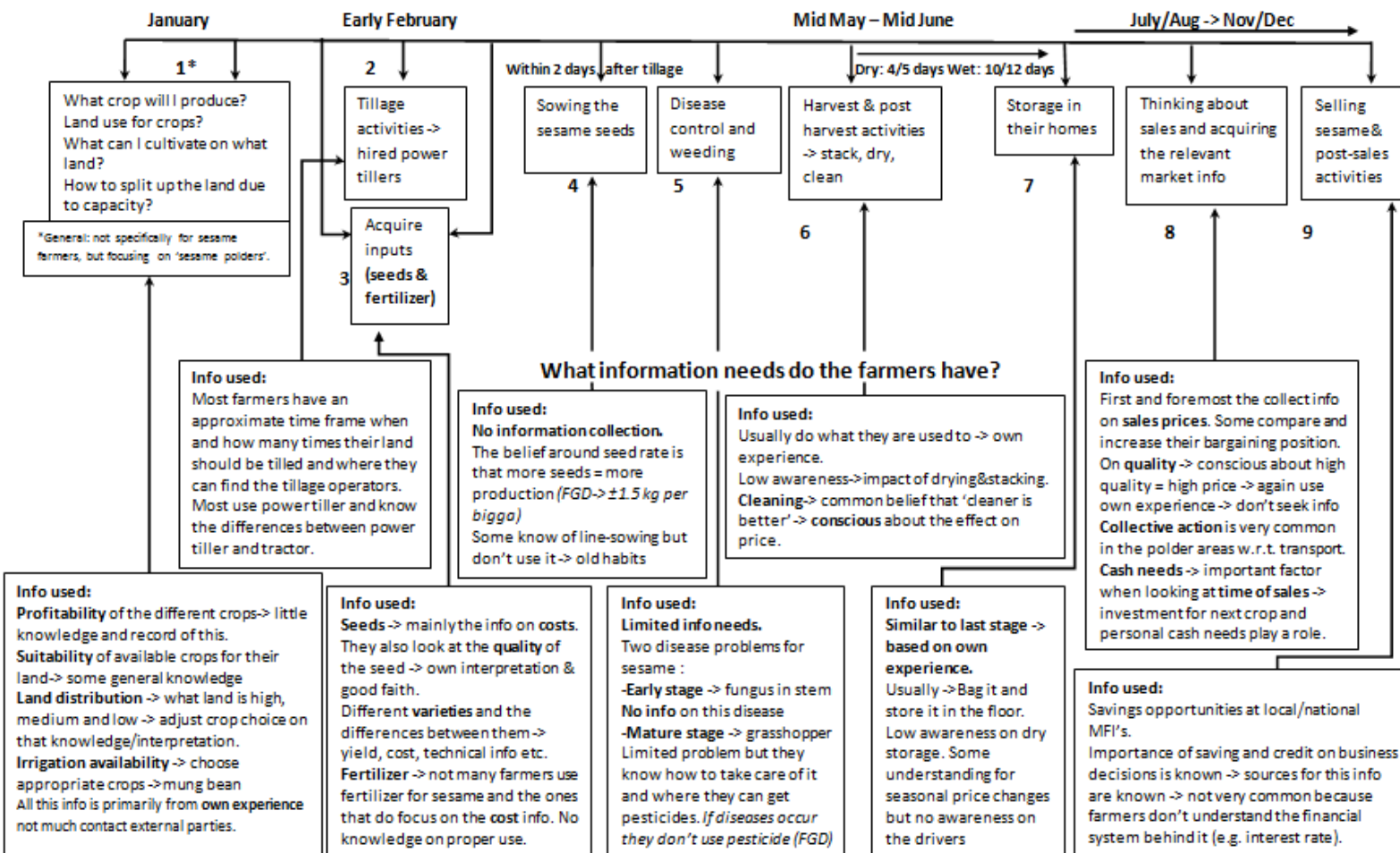


Figure 10. Step 1 and 3 Decision and Information model

Sesame Farmers' Decision Stages and Information Needs along their Value Chain (STEP 1 & 3)



## Appendix 3. Information needs

Table 19. Total FGD results per question

Question	# of Yes	% of Yes	# of No	% of No
1	13	68,4%	6	31,6%
2	9	47,4%	10	52,6%
3	7	36,8%	12	63,2%
4	7	36,8%	12	63,2%
5	7	36,8%	12	63,2%
6	19	100,0%	0	0,0%
7	19	100,0%	0	0,0%
8	15	78,9%	4	21,1%
9	17	89,5%	2	10,5%
10	18	94,7%	1	5,3%
11	14	73,7%	5	26,3%
12	0	0,0%	19	100,0%
13	0	0,0%	19	100,0%
14	16	84,2%	3	15,8%
15	17	94,4%	1	5,6%
16	3	16,7%	15	83,3%
17	2	11,1%	16	88,9%
18	15	83,3%	3	16,7%
19	12	66,7%	6	33,3%
20	0	0,0%	18	100,0%
21	16	88,9%	2	11,1%
22	16	88,9%	2	11,1%
23	17	94,4%	1	5,6%
24	15	83,3%	3	16,7%
25	9	50,0%	9	50,0%
26	7	38,9%	11	61,1%
27	4	22,2%	14	77,8%
28	16	88,9%	2	11,1%
29	12	66,7%	6	33,3%
30	5	27,8%	13	72,2%
31	16	88,9%	2	11,1%
32	5	27,8%	13	72,2%
33	5	27,8%	13	72,2%
34	8	44,4%	10	55,6%

From question 15 onward the sample size is 18

**Table 20. Total FGD results per stage**

Stages	# of Yes	% of Yes	# of No	% of No
1	43	45,3%	52	54,7%
2	38	100,0%	0	0,0%
3	64	56,1%	50	43,9%
4	36	65,5%	19	34,5%
5	17	47,2%	19	52,8%
6	76	70,4%	32	29,6%
7	9	50,0%	9	50,0%
8	60	55,6%	48	44,4%
9	18	33,3%	36	66,7%

**Table 21. Total FGD results per information need (answer to the question: Do you collect info on?)**

Information need	# of Yes	% of Yes	# of No	% of No
Suitable crops	13	68,4%	6	31,6%
Technical practices for suitable crops (2 Ques.)	16	42,1%	22	57,9%
Income of suitable crops	7	36,8%	12	63,2%
Costs of Suitable crops	7	36,8%	12	63,2%
Optimal times to till	19	100,0%	0	0,0%
Tillage options	19	100,0%	0	0,0%
Seed prices	15	78,9%	4	21,1%
Seed quality	17	89,5%	2	10,5%
Seed variety	18	94,7%	1	5,3%
Fertilizer price	14	73,7%	5	26,3%
Fertilizer use	0	0,0%	18	100,0%
Fertilizer quality	0	0,0%	18	100,0%
Seed rate	16	84,2%	3	15,8%
Land condition	17	94,4%	1	5,6%
Sowing techniques	3	16,7%	15	83,3%
Pesticides and Diseases	2	11,1%	16	88,9%
Weeding	15	83,3%	3	16,7%
Stacking	12	66,7%	6	33,3%
Water use during stacking	0	0,0%	18	100,0%
Drying	16	88,9%	2	11,1%
Cleaning (2 Ques.)	32	88,9%	4	11,1%
Storage	9	50,0%	9	50,0%
Price changes (3 Ques.)	16	29,6%	38	70,4%
Sesame price	16	88,9%	2	11,1%
Comparing prices (not really a need)	12	66,7%	6	33,3%
Sesame quality	16	88,9%	2	11,1%
Saving	5	27,8%	13	72,2%
Credit	5	27,8%	13	72,2%
Investment for next crop	8	44,4%	10	55,6%

## Appendix 4. Sources and information dissemination systems

Table 22. Source utilization per question (second exercise FGD)

Question	Total FGD with 'Yes'	# Own Ex.	# Other Farmers	# IP	# Extension officer	# Buyers	# Other
1	7	7	3	1	1	0	0
2	5	5	1	0	3	0	0
3	4	4	0	0	2	0	0
4	4	3	0	1	0	0	0
5	4	3	0	0	0	1	0
6	10	9	3	0	1	0	1
7	10	8	2	0	1	0	1
8	9	0	0	9	0	0	0
9	10	8	2	1	2	1	1
10	10	2	3	1	1	5	3
11	9	0	0	9	0	0	0
12	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0
14	10	9	2	0	1	1	3
15	10	10	1	0	0	0	0
16	2	0	0	0	0	0	2
17	1	0	0	0	1	0	1
18	9	4	0	0	1	0	1
19	7	6	1	0	1	0	0
20	0	0	0	0	0	0	0
21	10	9	1	0	1	1	0
22	9	8	2	0	1	0	0
23	10	9	1	0	1	2	0
24	9	7	1	0	1	2	0
25	6	6	0	0	1	0	0
26	6	0	1	0	0	6	0
27	5	1	0	0	0	4	0
28	9	0	0	0	0	9	0
29	6	0	0	0	0	0	0
30	4	1	0	0	0	4	0
31	9	7	0	0	0	4	0
32	4	0	0	0	0	0	4
33	4	0	0	0	0	0	4
34	5	5	1	0	0	0	0
<b>Total</b>	<b>212</b>	131	25	22	20	40	21
<b>Total %</b>	<b>212</b>	61,8%	11,8%	10,4%	9,4%	18,9%	9,9%

**Table 23. Source utilization per question, percentage of discussion groups**

Question	Total groups that said yes	Own Ex.	Other Farmers	IP	Extension officer	Buyers	Others
1	7	100,0%	42,9%	14,3%	14,3%	0,0%	0,0%
2	5	100,0%	20,0%	0,0%	60,0%	0,0%	0,0%
3	4	100,0%	0,0%	0,0%	50,0%	0,0%	0,0%
4	4	75,0%	0,0%	25,0%	0,0%	0,0%	0,0%
5	4	75,0%	0,0%	0,0%	0,0%	25,0%	0,0%
6	10	90,0%	30,0%	0,0%	10,0%	0,0%	10,0%
7	10	80,0%	20,0%	0,0%	10,0%	0,0%	10,0%
8	9	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%
9	10	80,0%	20,0%	10,0%	20,0%	10,0%	10,0%
10	10	20,0%	30,0%	10,0%	10,0%	50,0%	30,0%
11	9	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%
12	0	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
13	0	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
14	10	90,0%	20,0%	0,0%	10,0%	10,0%	30,0%
15	10	100,0%	10,0%	0,0%	0,0%	0,0%	0,0%
16	2	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
17	1	0,0%	0,0%	0,0%	100,0%	0,0%	100,0%
18	9	44,4%	0,0%	0,0%	11,1%	0,0%	11,1%
19	7	85,7%	14,3%	0,0%	14,3%	0,0%	0,0%
20	0	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
21	10	90,0%	10,0%	0,0%	10,0%	10,0%	0,0%
22	9	88,9%	22,2%	0,0%	11,1%	0,0%	0,0%
23	10	90,0%	10,0%	0,0%	10,0%	20,0%	0,0%
24	9	77,8%	11,1%	0,0%	11,1%	22,2%	0,0%
25	6	100,0%	0,0%	0,0%	16,7%	0,0%	0,0%
26	6	0,0%	16,7%	0,0%	0,0%	100,0%	0,0%
27	5	20,0%	0,0%	0,0%	0,0%	80,0%	0,0%
28	9	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%
29	6	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
30	4	25,0%	0,0%	0,0%	0,0%	100,0%	0,0%
31	9	77,8%	0,0%	0,0%	0,0%	44,4%	0,0%
32	4	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
33	4	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
34	5	50,0%	20,0%	0,0%	0,0%	0,0%	0,0%

Figure 11. Percentage of farmers that utilize 'Own Experience' as source (per stage)

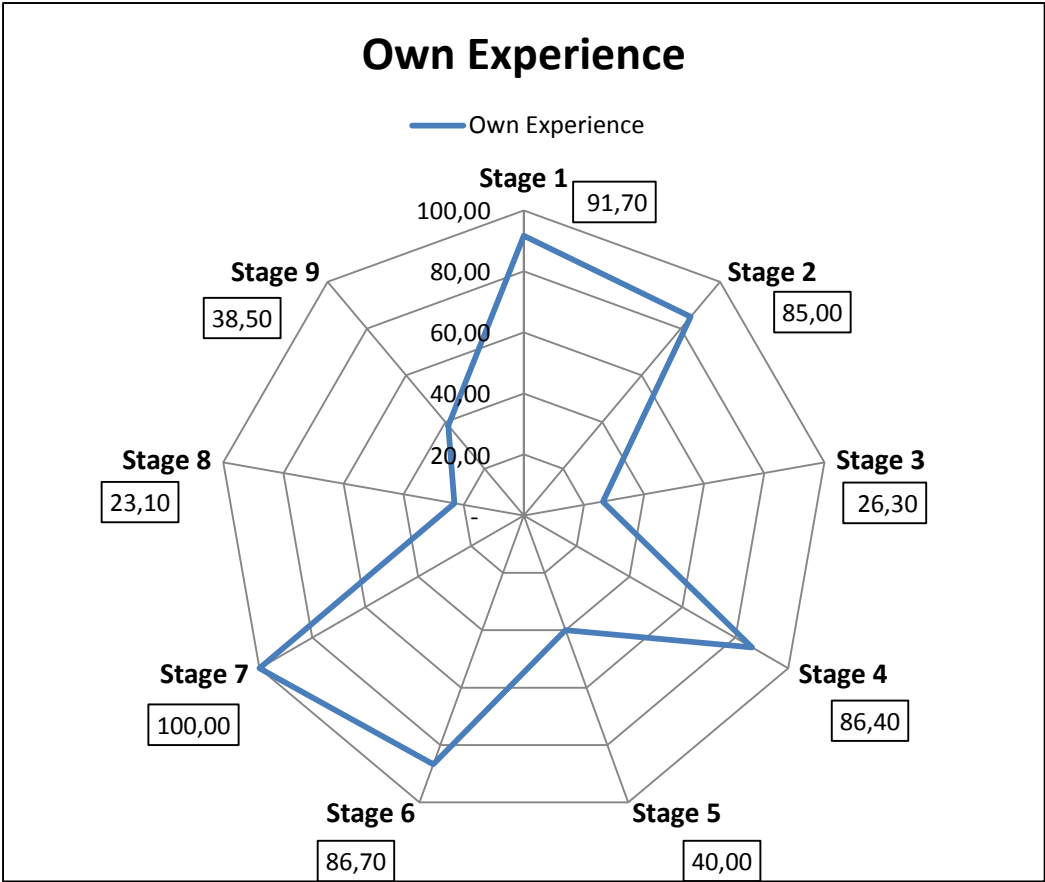


Figure 12. Percentage of farmers that utilize 'Other Farmers & Family' as source (per stage)



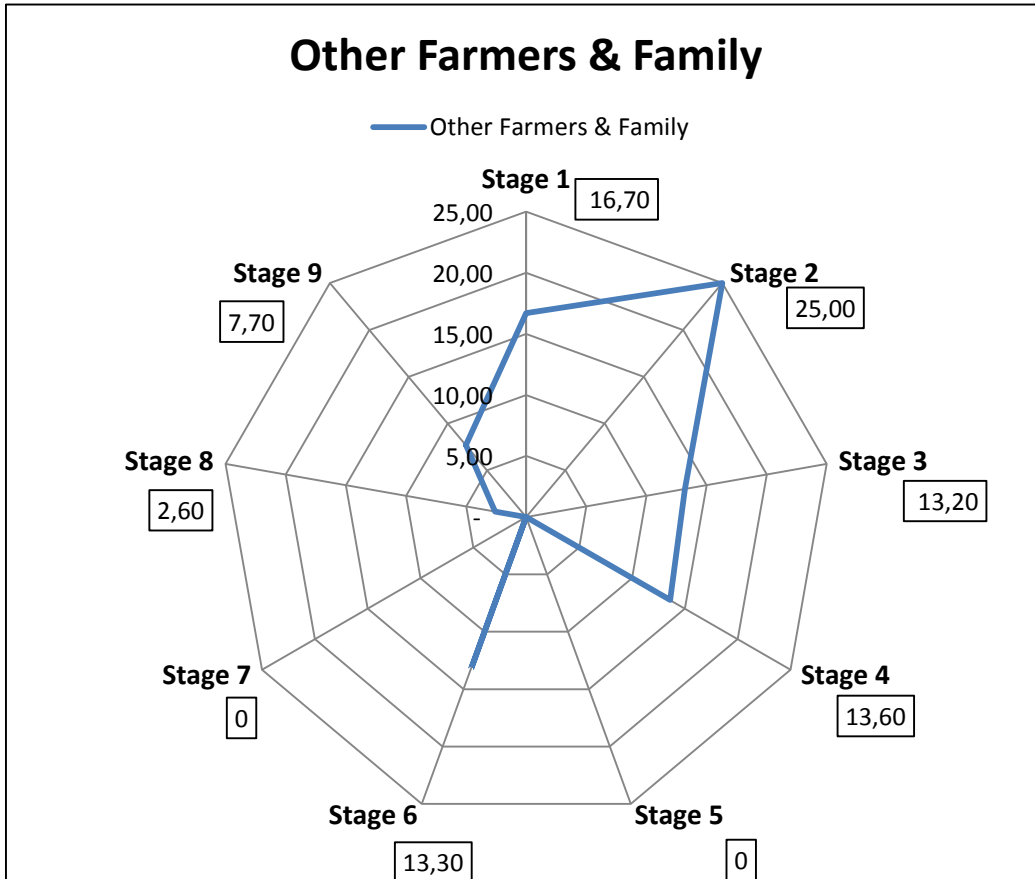


Figure 13. Percentage of farmers that utilize 'Input providers' as source (per stage)

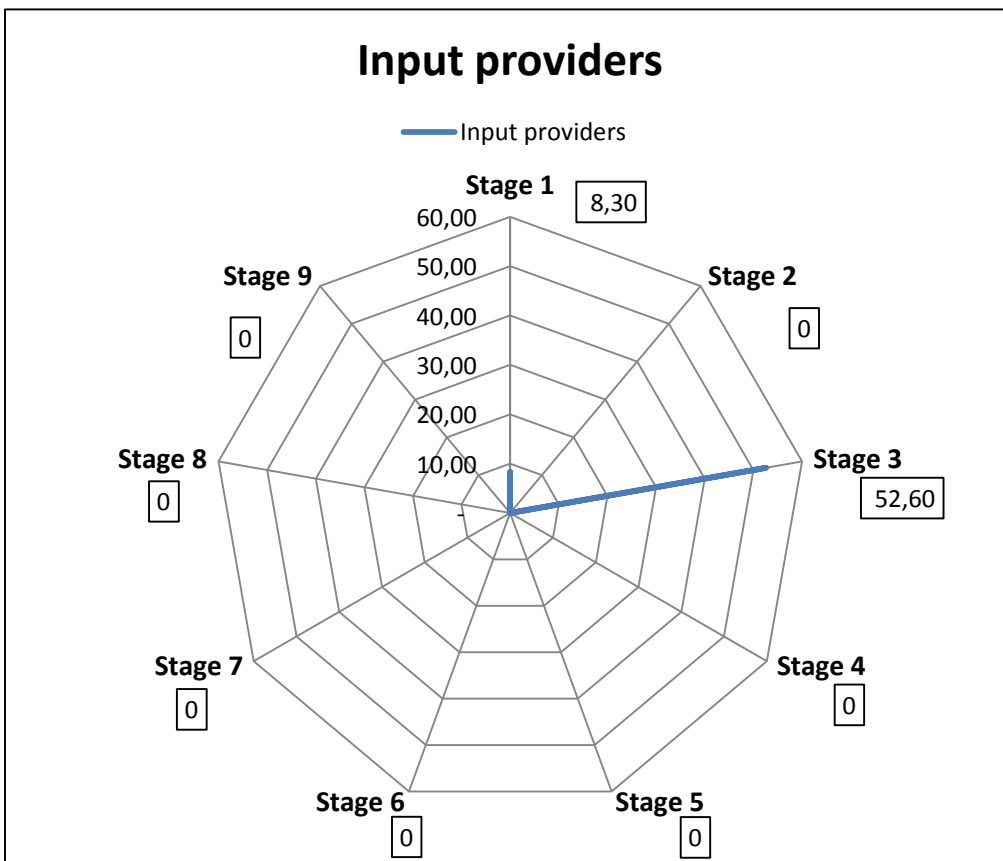
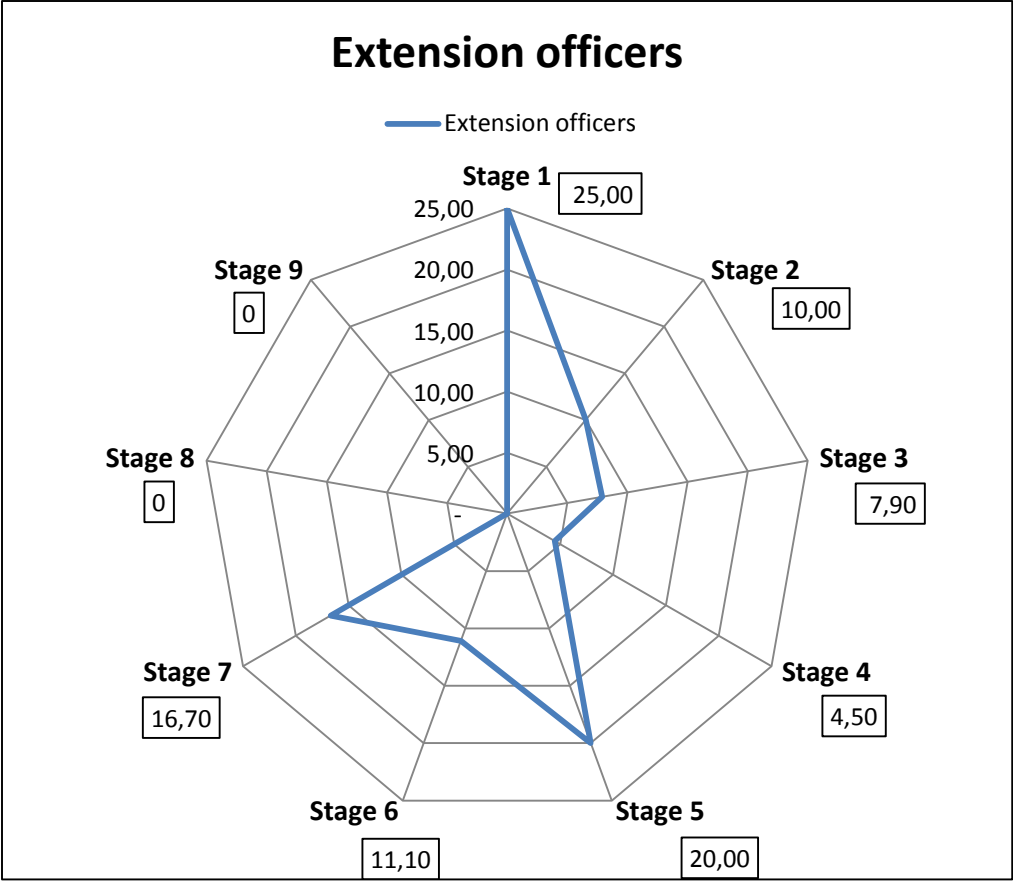


Figure 14. Percentage of farmers that utilize 'Extension officers' as source (per stage)



15.

Figure

Percentage of farmers that utilize 'Buyers' as source (per stage)

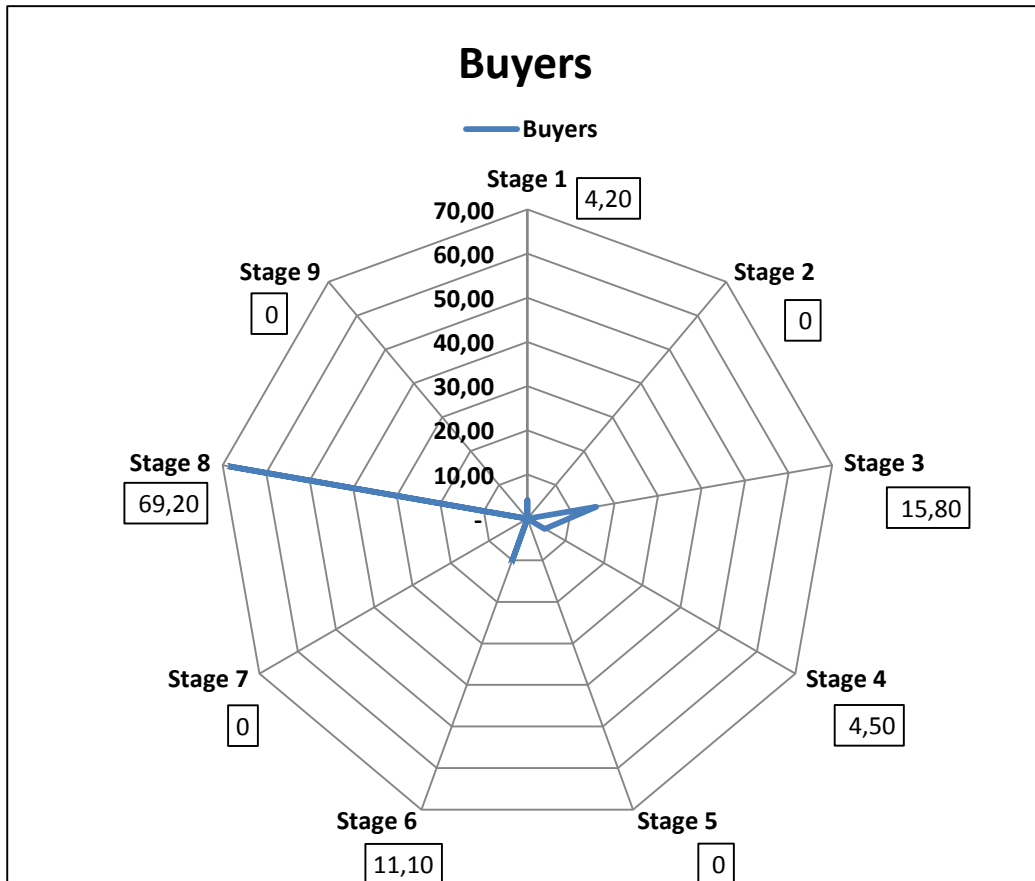
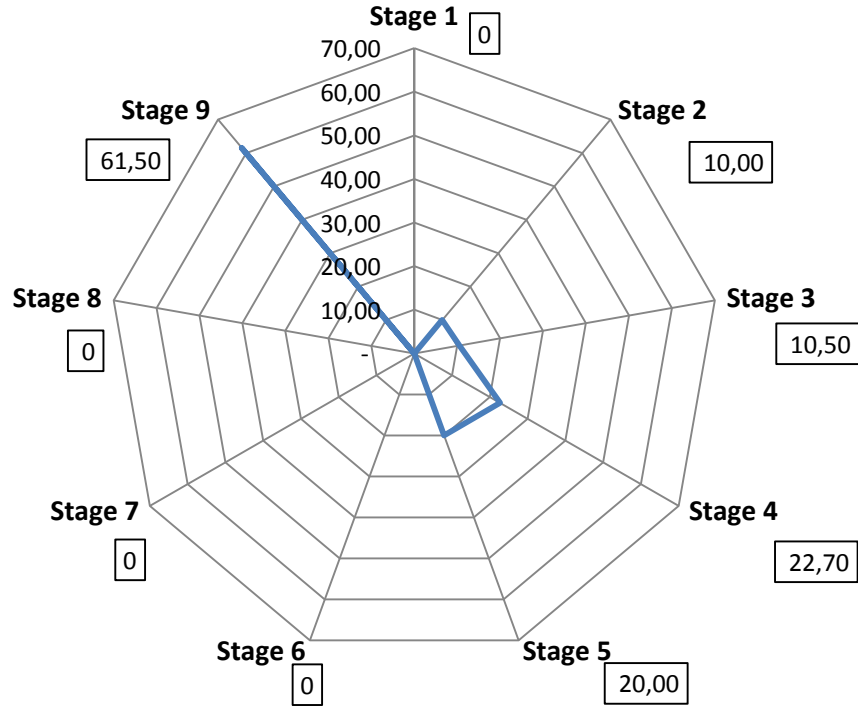


Figure 16. Percentage of farmers that utilize 'Others' as source (per stage)

# Others

— Others



**Table 24. DAM market related infrastructures**

The DAM has set up 82 market infrastructures on retail and wholesale level. The Asian Development Bank assisted in the facilitation of 76 markets infrastructures. These markets operate according to a policy manual through which 50% of the 24 market spaces is reserved for farmers and 10-15% is reserved for women entrepreneurs/farmers. The rest is open space.

Finally, this department set up assembly centres and storage facilities near market facilities, but not in the Blue Gold working area.

The assembly centres can be used for washing, cleaning, weighing and other pre sales activities. The storage facilities work with a credit system where farmers can get credit up to 80% of the market value of the stored goods when they store at those facilities, the product is a security for the bank. However this proposed credit system is prone to failure, because of the high credit rate. DAM wants to reduce this level of storage to reduce risk of non-payers.