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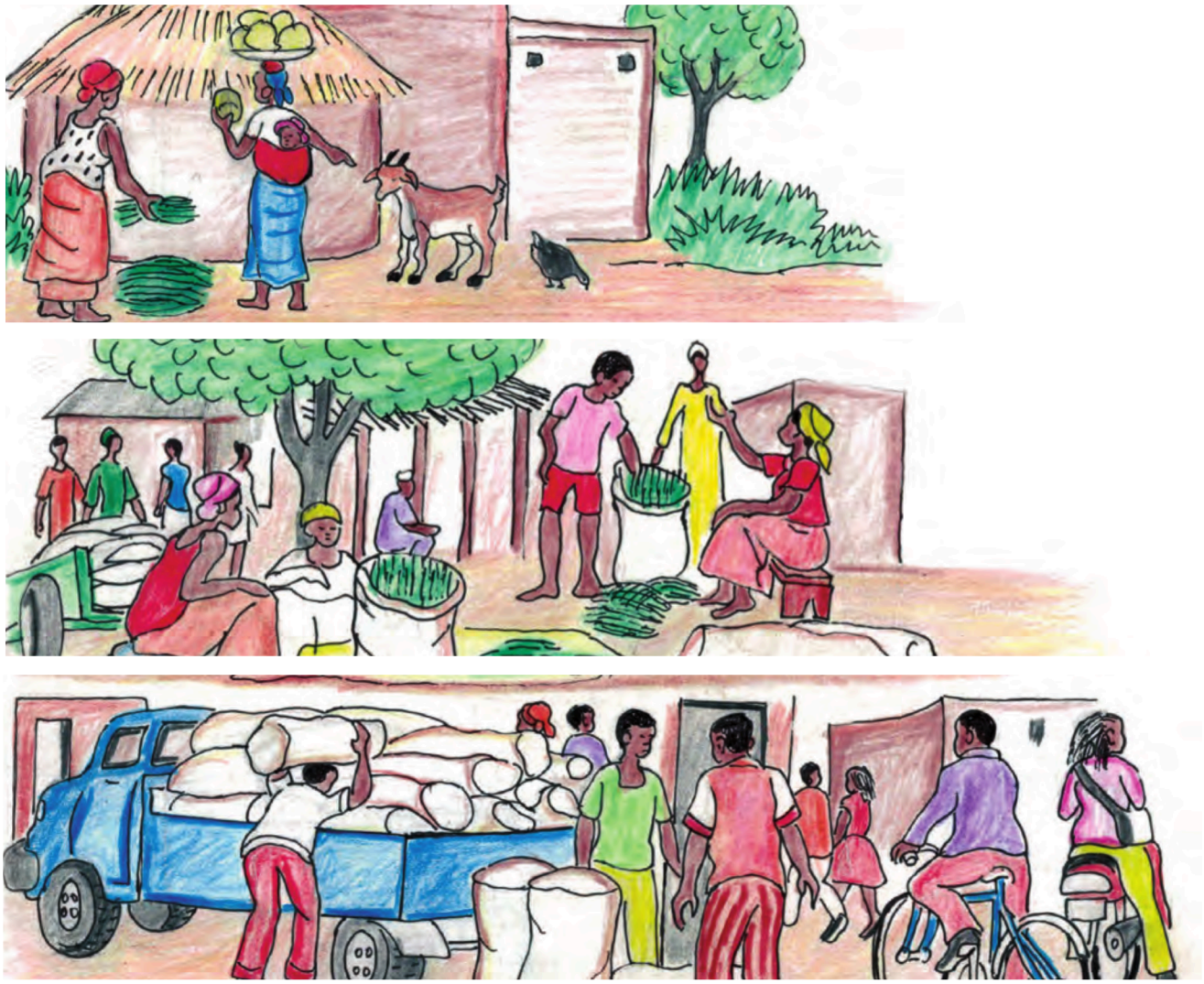

Mapping Actors along Value Chains: Integrating Visual Network Research and Participatory Statistics into Value Chain Analysis

Christian Stein and Jennie Barron

R4D Learning Series

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RESEARCH FOR DEVELOPMENT (R4D) LEARNING SERIES 5

Mapping Actors along Value Chains: Integrating Visual Network Research and Participatory Statistics into Value Chain Analysis

Christian Stein and Jennie Barron

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Project

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Cover image: Fodder markets in Burkina Faso. Source: Zakaria Ouedraogo [OZA], a local artist from Ouahigouya who lives and works in Ouagadougou, Burkina Faso.

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CONTENTS

SUMMARY

This report outlines a participatory approach for mapping actors along value chains. The methodology provides novel ideas on how to combine value chain analysis with participatory statistics and visual network research approaches, to generate valuable insights about complex value chains together with local stakeholders in a cost effective way. A framework is introduced, which provides a canvas for mapping actors onto different analytical dimensions relevant in value chain analysis. After outlining some of the conceptual foundations and the methodological approach, a sequence of steps for mapping actors and their relationships is described. The experience from a case study is used to illustrate the steps involved. The case study is on fodder value chains in the Sahelian agro-ecological zone of Burkina Faso, but the mapping approach can be adapted to a range of contexts.

Fodder market in Burkina Faso. *Photo:* Christian Stein.

1. INTRODUCTION

This document outlines a participatory approach for mapping actors along value chains and reports on a case study where this was applied in two communities in northern Burkina Faso. A value chain "is the set of value-adding activities through which a product passes from the design to the consumption stages. The worth of the product increases at each point of the process, hence the term value chain." (McCormick and Schmitz 2001, p. 155)

The livelihoods of agricultural producers are not just dependent on what they produce on the land, but also their ability to access resources such as fertilizers, seeds and other inputs "upstream" in a value chain as well as markets to sell their surplus produce "downstream" of where they are situated in a value chain. How producers are embedded in a value chain has implications for their ability to access resources, information and markets.

In short, producers are embedded in larger systems of activities, relationships that provide both opportunities and constraints for the improvement of agricultural production systems and peoples livelihoods (Riisgaard et al. 2010). A better understanding of the opportunities and constraints faced by agricultural producers to benefit from and/or reduce their risks participating in a value chain is important to ensure that markets work for the poor.

1.1. Why map actors along value chains?

Value chain analysis is about understanding how activities and actors that are involved in bringing a product from production to consumption are linked. *"There is a simple element at the heart of value chain analysis,- the idea of a chain is a metaphor for connectedness. It highlights the point that most goods and services are produced by a complex and sequenced set of activities"* (Humphrey and Navas-Alemán 2010, p. 11). The creation of a value chain map is usually an integral part of most value chain analysis (VCA). *"Analysing value chains comprises a whole series of different methods.* (…) *The most essential method and the core of any analysis is value chain mapping."* (Springer-Heinze 2007, p. 45). Mapping a value chain is a key component within a VCA, as it can be very difficult to see the relevant interdependencies in a complex system or discuss systemic interventions, without mapping them first. Mapping a value chain with its various components, linkages and actors can among other things, facilitate a structured discussion about the opportunities and constraints that producers and other actors face as well as what could be done to address them.

1.2. Shortcomings of existing mapping approaches

Value chains are not just a linear sequence of activities and associated actors (Bolwig et al. 2010; Talamini and Ferreira 2010). The notion of a chain seems to suggest a linear and sequential order that is unlikely to be found in the real world. Most VCA has focused on the vertical linkages, i.e. how a product comes into existence and then gets traded or transferred downstream the value chain. While it is important to know how actors and activities are linked vertically, it also important to understand the horizontal dimension, i.e. the relationships between actors at the same level of the chain (Bolwig et al. 2010). Horizontal linkages show how producers and other value chain actors are embedded in a value chain, but are frequently not included in VCA.

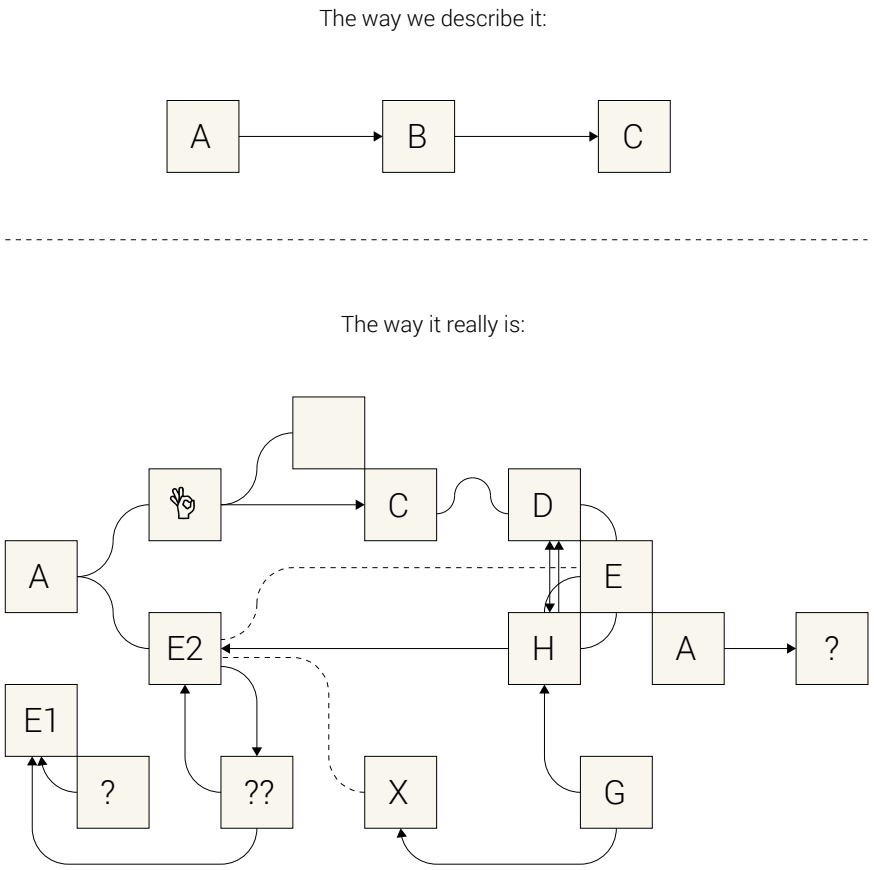
There are likely to be multiple channels through which a product can be traded across a value chain. It is important to recognize that there might be differences in the ability of actors to access resources or trade products, depending on their capacities, gender, relationships, etc. Besides from the characteristics of actors, it is also important to consider that an actor with a strategic position within a value chain is able to exercise some level of control over processes in the value chain. Depending on the relationships that actors have, they have different opportunities to access information or profit from participating in a value chain.

Therefore, understanding value chains is not just a matter of knowing how activities and actors are linked vertically in a linear fashion. It might be informative to distinguish between different channels and also consider the role of horizontal linkages connecting actors at the same level of the value chain (Dunn 2014). A typical example of horizontal linkages would be an association of producers, where the function of horizontal linkages could be to empower farmers, reduce transaction costs or to gain better access to inputs and services.

It is important to note that producers or indeed other actors along a value chain are typically not a homogenous group of actors, but have very different assets, skills, rights, preferences, etc. depending on age, gender or class. Therefore, it might be necessary to differentiate between types of actors, for example through collecting gender disaggregated data. When differentiating between actors and taking into account the horizontal linkages between them, many value chains resemble more a network than a linear chain. (Nijhoff-Savvaki et al. 2012; Talamini and Ferreira 2010). Figure 1 shows a stylized description of how value chains are often described as a linear sequence of activities (top). However, the real world can be much messier, as Figure 1 (bottom) suggests, and charting a path through complex value chains will sometimes requirer mapping multiple pathways (Kaplinsky and Morris 2001).

Systematically mapping diverse actor networks along these value chains provides a better understanding of how they operate and what could be done to improve their functioning for the benefit of producers. This document presents a methodological approach to map actors along fodder value chains. A pilot study in the Yatenga province of Burkina Faso tested the methodology, which combines value chain analysis with ideas from participatory statistics (Holland 2013) and visual network research (D'Angelo et al. 2016).

FIGURE 1. AN ILLUSTRATION OF HOW VALUE CHAINS ARE OFTEN DESCRIBED (TOP) AND HOW THEY TYPICALLY LOOK (BOTTOM).



Source: Authors illustration adapted from Brown et al. 2000

2. WHAT IS INNOVATIVE ABOUT THE PRESENTED APPROACH?

The participatory visual mapping approach outlined in this document describes how to map a value chain, with a particular emphasis on the actors involved and their vertical as well as horizontal relationships. The approach draws on three broad strands of literature, namely social network research (Robins 2015), visual research (Banks 2007) and participatory statistics (Barahona and Levy 2007), that could complement and enrich value chain analysis in general and value chain mapping in particular, but have only been applied to VCA to a limited extent. The value chain mapping (VCM) approach was developed, so that it can be done as a stand-alone activity to map actors along value chains. The ideas presented here can complement and enrich existing VCA approaches and hopefully inspire others to integrate elements into their own work on value chains and beyond.

2.1. Social network research

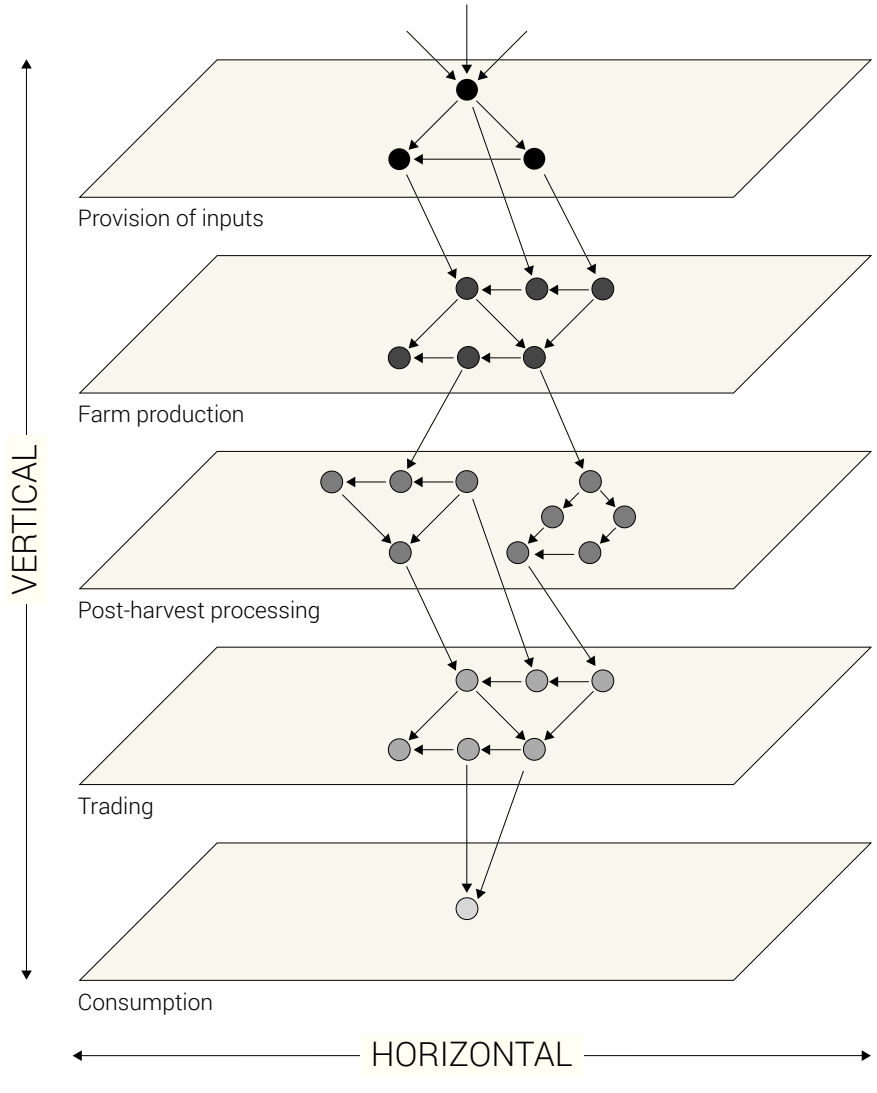
Social network research explores how relationships shape the behaviour of individual actors or the performance of a system as a whole. A better understanding of the relations characterising value chains can help identify opportunities and constraints faced by agricultural producers, as well as bottlenecks of the system as a whole.

The approach to value chain analysis presented here aims to more explicitly bring the horizontal linkages into the analysis. There is a rich literature in the field of social network research that can provide relevant insights and guidance on how to capture, describe and analyze actors and their relationships using qualitative, quantitative and visual methods (Crossley 2010; Domínguez and Hollstein 2014; Fuhse and Mützel 2011; Hogan et al. 2007; Scott 2013). Concepts and theories from the field of social network research, such as centrality, brokerage and structural holes (Burt 2005), can also be helpful to better understand the possible implications of relationships in a value chain. Earlier work on 'netchains' (Lazzarini et al. 2001) has attempted to integrate ideas from the fields of VCA and social network analysis (SNA). Figure 2 illustrates a generic 'netchain' comprised of horizontal links between actors within a specific value chain activity (or layers) and the vertical links between actors in different layers.

2.2. Visual research methods

Visual research methods rely on the use of images instead of words and numbers to produce or represent knowledge. This allows for more engaging data collection and analysis on complex issues that would be difficult to capture with interviews or questionnaires (Bagnoli 2009; Healy and Moody 2014). Especially in situations where research participants have limited ability or use in daily life for written or read communications, visual approaches can be useful. In addition, a participatory approach can overcome survey instrument limitations. Surveys typically assume the survey designer has full insight into all relevant issues to consult upon (Chambers 2007). Temporal dynamics and issues unknown

FIGURE 2. AN EXAMPLE OF A GENERIC 'NETCHAIN' WITH HORIZONTAL AND VERTICAL LINKAGES BETWEEN ACTORS.



Source: Authors illustration adapted from Lazzarini et al. 2001

to the researcher are difficult to capture in standardized interviews or surveys. However, drawing a timeline can be a simple, but effective method within a longitudinal research framework to capture, for example, seasonal changes and so allow research participants to reflect upon past, present and future events. Drawing can also be used to support visioning or scenario development processes (van Rooyen et al. 2017). Figure 3 below shows a picture drawn by research participants during a visioning process about how to improve livestock value chains in Malawi, with the current situation on the left and the vision for five years from now on the right.

2.3. Participatory statistics

Participatory statistics is a type of research, in which local people themselves generate numbers (Barahona and Levy 2007; Hargreaves et al. 2007). It combines statistical methods with participatory approaches. Participatory statistics can be a cost effective and timely way to generate quantitative data that is locally grounded (Holland 2013). It can also give a voice to people that have in depth knowledge on issues relevant to policy and research.

Participatory statistics have been used in diverse geographic locations, at the local as well as national level. Methods often used to generate numerical data include for example: participatory mapping, participatory modelling, proportional piling, card writing, marking, sorting, ordering and positioning, matrix ranking and scoring, pair-wise ranking, linkage diagramming, pocket voting (Chambers 2008 in Holland 2013). Figure 4 shows research participants using proportional piling to identify swine fever hot spots along a pig value chain in Uganda. Participatory approaches and methods hold the potential not only to illuminate dimensions that are difficult to access otherwise, but also to produce accurate statistics (Barahona and Levy 2007; Chambers 2007; Holland 2013).

3. METHODS COMMONLY USED IN VALUE CHAIN RESEARCH

The purpose of the following section is to briefly summarize a range of methods that are commonly used for researching value chains and which can complement the VCM approach presented here. These methods include: (1) interviews, (2) focus group discussions, (3) surveys, (4) document analysis, and (5) participatory observations. This list is by no means intended to be conclusive, but should highlight that value chain mapping and analysis can benefit from a range of methods and their combination.

Interviews: Interviews with local experts and different actors along the value chain can be helpful to contextualize the value chain mapping exercise. Interviewees can, among other things, point out what activities or types of actors are relevant to include in the value chain map. If the value chain analysis focuses on a particular activity and group of actors, such as farmers, it might be useful to interview other actors upstream and downstream in the value chain to get a more comprehensive understanding of the system as a whole.

Focus group discussions: Focus group discussions are particularly useful as they bring out a range of different opinions on, and possibly contrasting understandings of, a particular value chain. Focus group discussions could be

FIGURE 3. A DRAWING SHOWING THE SITUATION AS IT IS TODAY (LEFT) AND THE VISION FOR FIVE YEARS FROM NOW (RIGHT), PRODUCED BY STAKEHOLDERS DURING A VISIONING PROCESS AROUND LIVESTOCK IN MALAWI.

Photo credit: ICRISAT/André van Rooyen

FIGURE 4. A UGANDAN ANIMAL DRUG STOCK SUPPLIER USES PROPORTIONAL PILING TO IDENTIFY SWINE FEVER HOT SPOTS ALONG THE PIG VALUE CHAIN IN MASAKA DISTRICT.

Photo: ILRI/Brian Kawuma

held with a group of people that are involved in the same value chain activity, possibly disaggregated by age, gender or other relevant characteristic that could inform the analysis. A focus group could also bring together a diverse group of people involved in different activities, such as producers, traders and consumers.

Surveys: Survey data can shed light on questions like what kind of products are mostly traded, what the value of these products are and how the value changes along the value chain. Survey data can also be used to identify differences among attributes or characteristics that may be relevant for understanding the value chain. For example, what percentage of households are trading a certain product? Are there marked differences among actors that should be considered in the study design?

Document analysis: Documents about the research context such as project reports from non-governmental organizations, or government statistics, may contain relevant information about the value chain in question. Some documents might be readily available and can help in preparing the research. However, sometimes statistics especially over longer periods and at the local level are difficult to access, but could be collected during fieldwork to later inform the VCA.

Participatory observations: Participatory observations can be an effective way to gain locally grounded information, especially when little is known about the value chain. Visiting markets, observing traders, following actors and/or products along the value chain can all generate new and unexpected insights.

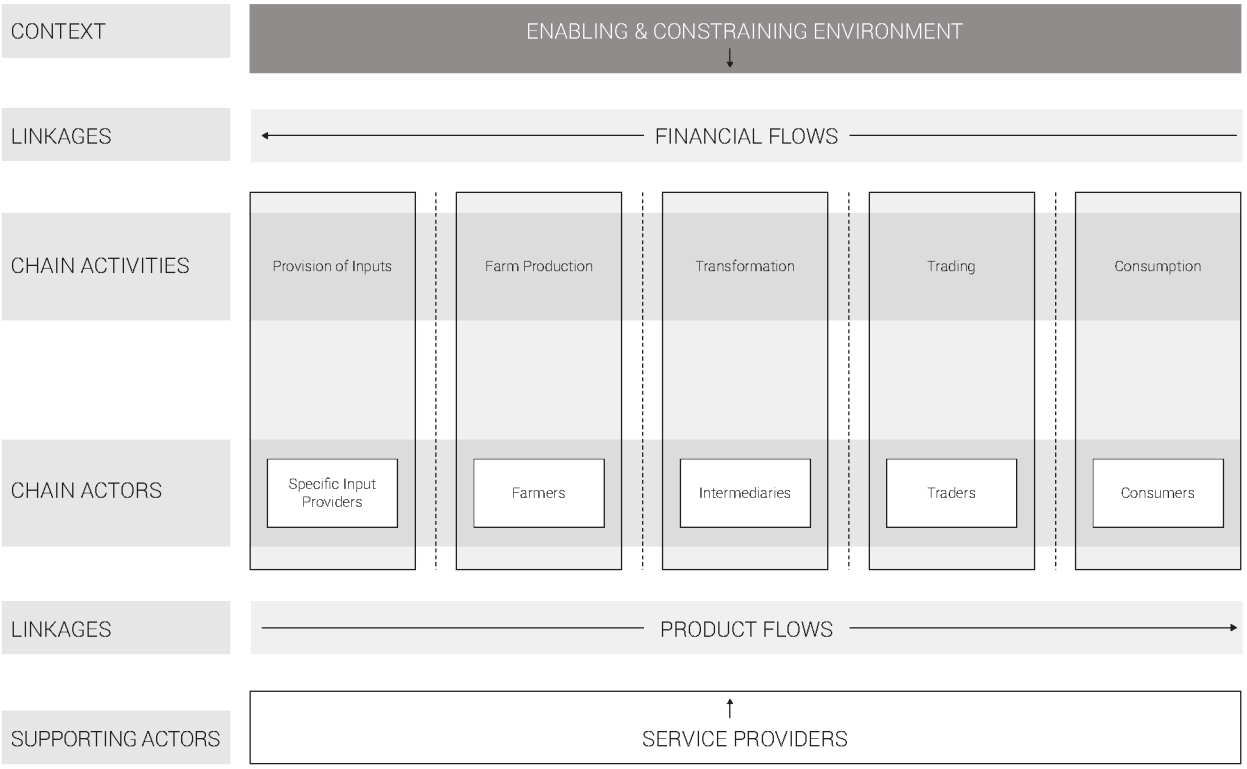
There is not a single, universally appropriate method for studying value chains and often the combination of different methods is most informative. Both qualitative and quantitative methods can be applied in value chain analysis. There is no rule for what research approach (quantitative or qualitative) is most useful. Hellin and Meijer (2006) recommend the use of qualitative approaches first, followed by quantitative approaches if time and resources permit. Initial qualitative research or production of a value chain map can also help in designing a questionnaire that is more targeted and aligned with a specific socio-political context. Above all, the specific context and the research question should determine what methods to use and in what sequence to combine them.

4. THE MAPPING CANVAS: KEY CONCEPTS AND ANALYTICAL DIMENSIONS

The following section describes the key concepts and analytical dimensions that make up the mapping canvas that guides the VCM process. The concepts constitute a synthesis of the key building blocks of a value chain map as commonly found in much of the literature on value chains and value chain analysis. The canvas is not intended to be prescriptive, but it does provide a pragmatic way to capture some of the key analytical dimensions that should be considered when mapping value chains and the actors influencing them.

Value chain analysis aims to understand the functioning of a value chain and to identify and support implementation of upgrading strategies. Upgrading can be broadly defined as a desirable change in chain participation that increases rewards and/or reduces exposure to risk (Riisgaard et al. 2010). Typically, such analysis is supported by a value chain map, which consist of (1) value chain activities, (2) value chain actors, (3) value chain linkages, and (4) a context in which the value chain is situated. These four elements are frequently part of a value chain map and as such can provide an orientation for what to map in a particular context. The key elements and analytical dimensions relevant for value chain mapping and analysis are depicted in Figure 5, which provides a generic canvas that can help to guide a mapping process.

FIGURE 5. THE MAPPING CANVAS WITH KEY ELEMENTS AND ANALYTICAL DIMENSIONS RELEVANT FOR VALUE CHAIN MAPPING AND ANALYSIS.



Source: Authors illustration

The following definitions are intended as an orientation for the reader. While the names may differ depending on the literature at hand, the concepts described here denote important analytical dimensions commonly explored in value chain analysis.[1]

Value chain activities: Value chains comprise all the activities from production to consumption, as well as waste utilization, of a certain product. Typical examples of activities along an agricultural value chain include: specific inputs, production, collection, transformation, trade, export, wholesale and retail marketing, consumption (Faße et al. 2009).

Value chain actors: Actors are all the individuals or organizations, enterprises and public agencies related to a value chain and therefore important for understanding the functioning and performance of the value chain. They are often – but not necessarily – associated with particular value chain activities.

For analytical purposes, it often makes sense to differentiate between chain actors and supporting actors. *Value chain actors* are those who are actually directly involved in value chain activities. Typically in our examples they are farmers, wholesalers, or retailers. What they have in common is that they become owners of the (raw, semi-processed or finished) product at one stage in the VC. *Supporting actors* (or service providers) can play an important role, but they are not directly involved in value chain activities. A typical example would be an extension service provider or an NGO involved in capacity building.

Value chain linkages: Value chain linkages are the channels or relationships that connect the different value chain activities and through which a product passes from the design to the consumption stages. One can differentiate between vertical and horizontal linkages.

Vertical linkages connect actors involved in different activities of the value chain, from input suppliers to producers, processors, wholesalers, distributors, exporters, and so on, all the way to the consumer. Vertical linkages are the commercial relationships involved in bringing the product up through the value chain (Dunn 2014). *Horizontal linkages* connect actors performing the same activity within the value chain. An example of horizontal linkages would be producer groups. Important functions of horizontal linkages include more cost-effective access to inputs, services and information; and the empowerment of farmers to advocate for change (Ibid).

[1] It is important to note that similar concepts are sometimes named differently in the literature on VCA. For example, all value chains can be thought of as being made up of interlinked activities. Typical activities along a value chain might include production, transformation, transport, and consumption. However, what we call value chain activities is sometimes also called value chain functions (Springer-Heinze 2007), stages (Faße et al. 2009), levels (Dunn 2014) or segments (Bolwig et al. 2010). The same is true for linkages, which are sometimes also called relationships, flows etc., as well as other concepts and analytical dimensions.

Value chain context: this can be understood as external to the value chain since it is not directly 'operated' by chain actors, although they may try to influence it. According to Bolwig et al. (2010, 186) this broader context can "include public and private regulation, corporate strategies, civil-society influence, local/national politics, supporting sectors (for example, finance and transport), infrastructure, resource tenure system, etc." The value chain context could also include enabling and constraining environmental factors, such as the availability of land and water resources, which influence farmers' production systems.

5. A STEP-BY-STEP GUIDE FOR MAPPING ACTORS ALONG VALUE CHAINS

Research context

The methodological approach described here was piloted for mapping fodder value chains with two communities in the Sahelian agro-ecological zone of Northern Burkina Faso, in December 2015. Both communities depend on mixed livestock-crop systems for their livelihoods and are affected by a lack of biomass in the landscape during the annual 9-month dry season. The value chains were mapped together with 10-15 male and female participant farmers, livestock-keepers from the two communities of Pogoro-Silmimossin and Thiou, which are about 40 km from the regional capital of Ouahigouya. Figure 6 shows the location of the case study sites.

5.1. Materials needed

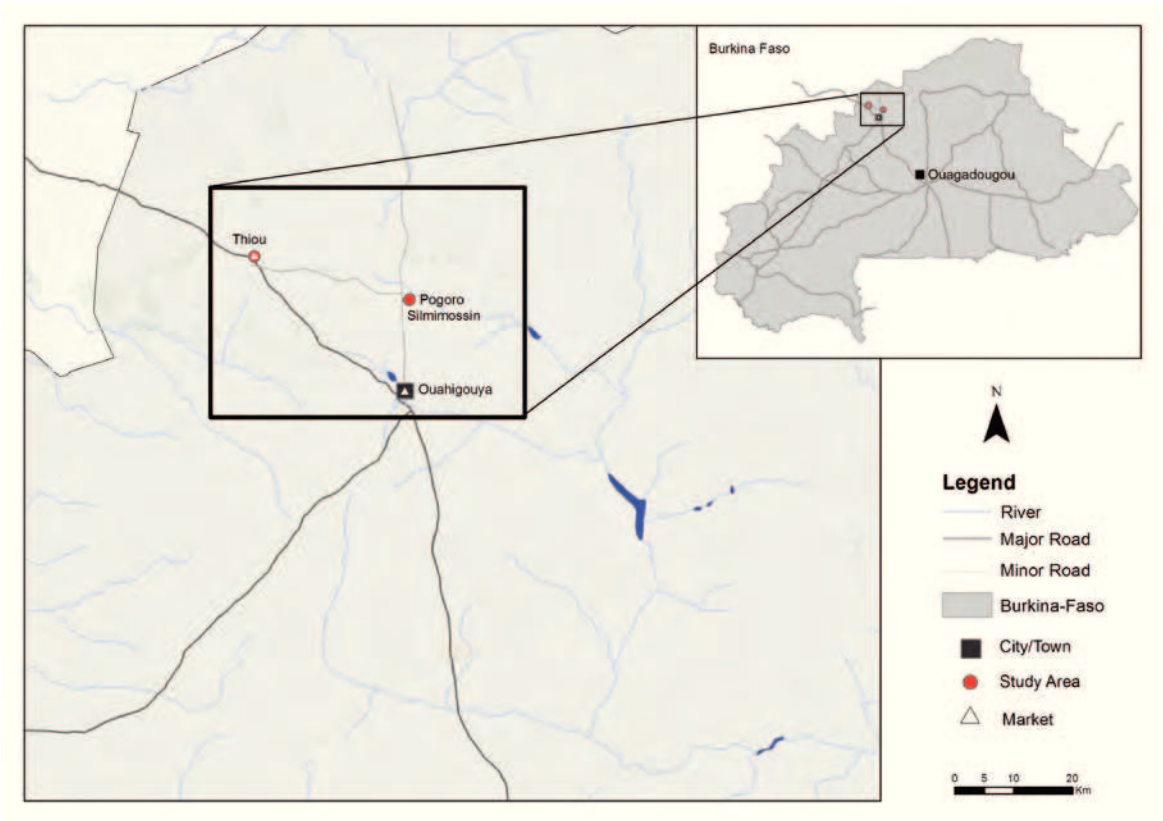
The materials needed to create a value chain map are low cost and similar to what is commonly found in a facilitation toolkit for participatory methods. The list below contains simple and useful materials, but in theory much can be substituted or adapted by using what is available locally, e.g. seeds or stones.

- Large sheets of paper for drawing the value chain map
- Multi-colored sticky notes for noting down the actor names
- Multi-colored pens for drawing the linkages
- Game tokens, checker pieces or alternatively locally available seeds, stones to generate participatory statistics
- Drawings, photos, figures or shapes to visually depict specific analytical dimensions on the map
- Data recording equipment such as notebooks, audio recorder, video or photo camera.

5.2. Creating the value chain map

The mapping process consists of two main steps and a sequence of activities. The first stage is the drawing of the

FIGURE 6. THE CASE STUDY SITES OF THIOU AND POGORO-SILMIMOSSIN.



Source: IWMI

value chain map. The aim is to get all the relevant dimensions from the analytical framework on paper, e.g. value chain activities, actors, links, and context (see Figure 5 of the mapping canvas above). The second stage is the joint analysis, interpretation and discussion of the map with research participants. This may involve discussion of opportunities and constraints for value chain upgrading based on the map and/or the validation of the value chain map.

The output of the first stage is the actual value chain map, i.e. a visualization of the full value chain with its constitutive parts and how they relate to each other. In the second stage the VCM is used to bring out stories about how the system functions, what opportunities and constraints exist, as well as potential ways to improve the value chain.

It can be difficult to see the connections in a complex system or discuss systemic interventions, without mapping them first (cf. Burns and Worsley 2015). Therefore mapping the value chain is often a necessary first step. However, a value chain map alone is often only of limited value without asking deeper questions about what is going on and why it is that way. Therefore, the two stages of the value chain mapping are mutually supportive.

Value chain activities

To provide an initial structure and orientation, the activities necessary to bring a product from inception to consumption are the first elements that go onto the blank sheet of paper. The activities can be written on paper cards that are placed on top of the map, but the activities could also be represented visually by using drawings or photographs. Since the value chain activities are on paper cards, they can be rearranged until participants consider all the relevant activities along the chain are captured and represented in a logical order.

To arrange the activities according to time, from production to consumption, is just one possible way to represent the activities. Another organizing principle could be to arrange activities by where they take place in a landscape geographically. This could be supported by including visualisations of local landmarks that help to orient research participants, e.g. roads, markets, nearby cities, etc.

In our case study of value chains in Yatenga province of Burkina Faso, we found drawings, made by a local artist familiar with the study area, to be very effective in structuring the value chain mapping processes. This was especially the case since most participants in the study areas had limited capacity to read and write. Hence, visualisations helped to orient research participants on the map. Figure 7 shows the activities involved in the fodder value chains from northern Burkina Faso.[2] Having value chain activities arranged on the map provides some initial structure for the mapping processes to unfold.

Value chain actors

After placing the activities on the map, research participants are asked to think about those actors who are part of the value chain. The names of the actors are written down on sticky notes and then placed on the map. Sometimes it may help to move from one value chain activity to the next and elicit

FIGURE 7. DRAWINGS OF THE VALUE CHAIN ACTIVITIES FROM LEFT TO RIGHT, FROM INPUTS TO PRODUCTION (TOP) TO FINAL CONSUMPTION (BOTTOM).

Source: Created by Zakaria Ouedraogo in 2015

[2] The drawings have been created by Zakaria Ouedraogo (OZA), a local artist originally from Ouahigouya where the pilot study took place, but now based in Ouagadougou.

the associated actors in the processes, placing them below the value chain activity. At the beginning it is not important where the actor cards are placed. What is more crucial is to collect as many potentially relevant actors as possible and place them on the map, i.e. large sheet of paper.

Occasionally research participants debate what actors should go on the map or start by taking notes for themselves prior to writing them on the actor cards. This should be discouraged by the facilitator, as it takes away valuable time that is better used later to discuss the value chain map, once everything is on it. It's good to explain that the map can be changed later and that the debates that participants may want to have are more fruitful once the initial map is completed and it contains all the crucial elements.

It is also important to establish the appropriate level of detail at which actors should be mapped. For example, it is usually not helpful to use a generic label for actors such as non-governmental organizations (NGOs), producers or government organizations, when the actors are very diverse. As a rule of thumb, an actor should be further disaggregated into different types of actors, if they have qualitatively different functions, interests, etc. in the value chain. If these actors are not disaggregated in this way, important differences would be lost when they are lumped together. For example, if there are multiple NGOs that focus on different value chain activities or work with distinct actors, then they should be mapped individually.

Value chain links

When all the actors in the value chain have been mapped, the so called supporting actors should be included using sticky notes of a different colour to differentiate them from those actors who are directly involved in the value chain. After all actors have been placed on the map, it is possible to rearrange them on the map in a way that makes sense to research participants, possibly using the value chain activities as an orientation. Research participants should also be asked if there are any missing actors and if so add them to the map. Figure 8 below shows the value chain map, with value chain actors being placed below the value chain activities they are associated with.

Value chain context

Once all the relevant actors are identified on the map, the linkages connecting the various actors are drawn. Depending on the value chain as well as the research question, different types of links may be relevant to map. Many value chain maps trace the flow of a product through the value chain and there is usually an inverted flow of money going in the other direction. Other potentially relevant links could be information,

FIGURE 8. VALUE CHAIN ACTORS WRITTEN DOWN ON STICKY NOTES PLACED ON A LARGE SHEET OF PAPER.

Photo: Christian Stein

the sharing of technical expertise, persistent contract relationships or uncoordinated "arms length" free market transactions. No matter what the actual links are, they need to be defined by the research team and/or research participants and everybody involved in the mapping process should have a common understanding of what a link represents. Different links, e.g. information, money, etc., should be drawn with a different coloured pen. There are many possibilities and a lot of flexibility in how a value chain map can be drawn. However, it is important that visual codes are clearly defined, understood by all participants and always used consistently. Including a legend on the map can help. In Figure 9 research participants discuss the flow of fodder from production to consumption and draw linkages between actors on the value chain map.

Understanding the opportunities and constraints of producers within a given value chain needs to account for what is happening within the chain, but also contextual factors that influence the performance of that chain (Bolwig et al. 2010). Infrastructure, policies, trade-agreements, access to credit, property rights, are some examples of factors that are external to the value chain, but which could significantly impact on its performance and should therefore be consider in value chain analysis. In the actual mapping process these contextual factors can be written on sticky notes with a different colour and placed on top of the map.

What factors are relevant will depend on the specifics of the research context and question. The important point is to open-up the mapping process and take into account broader system dynamics. For example, by considering certain cultural practices or religious customs it might become clearer why certain actors are disadvantaged in the value chain. Contextual factors may be difficult to control, especially in the short term, but nevertheless important to be aware of in order to understand what changes might be possible. For example, during the mapping exercise in Burkina Faso research participants mentioned among other things access to credit, affordability of improved seeds, relations with local government and the role of traditional leaders. These contextual factors are captured on pink sticky notes as shown close to the top of Figure 10.

FIGURE 9. A VALUE CHAIN MAP WITH LINKAGES INCLUDED.

Photo: Christian Stein

FIGURE 10. THE VALUE CHAIN MAP WITH IMPORTANT CONTEXTUAL FACTORS ON LARGER PINK STICKY NOTES.

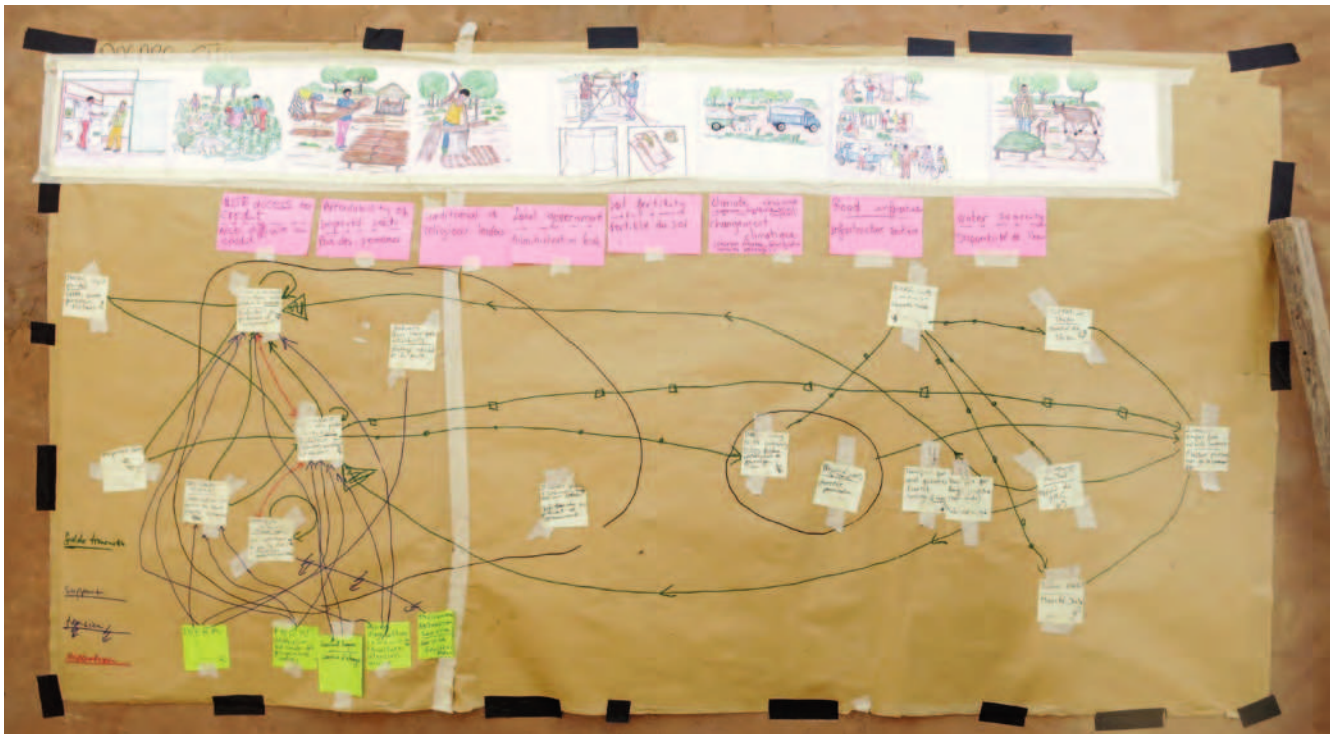


Photo: Christian Stein

5.3. Generating numbers using participatory statistics

With activities, actors and linkages visualized on the map, it is now possible to quantify certain aspects of the value chain using participatory statistics. Who are the most influential actors in the value chain? What value chain activities are most critical to reduce the risks for producers or increasing their benefits? How is the increase in value of the product along the chain distributed among actors, i.e. who benefits and who losses out? These and a range of other questions can be explored using participatory statistics in combination with the value chain map. To generate the participatory statistics, discs, seeds, stones or other objects can be distributed on the map to quantify analytical variables important for answering the research question at hand.

For example, during the pilot study in Burkina Faso, we asked participants how influential the various actors in the value chain were. Participants then used checker pieces and placed stacks of different heights next to each actor. The more checker pieces, the higher the stack and hence the more influential the actor (cf. Hauck et al. 2015; Schiffer and Hauck 2010). Similarly, seasonal fluctuations in market price and a range of other variables could be measured using participatory statistics. Figure 11 below shows the value chain map drawn by one of the communities in Burkina Faso. The relative influence of an actor is measured by placing checker pieces next to the token representing the actor.

Counting the number of seeds used in a matrix scoring exercise can be an effective way to priorities different upgrading strategies (Mayoux and Chambers 2005). There are many ways to generate participatory statistics and it is beyond the role of this document to provide an overview of this field. The interested reader should consult the appropriate literature, e.g., "Who Counts? The Power of Participatory Statistics" by Jeremy Holland (2013) provides an excellent introduction to the field.

5.4. Validating the value chain map

The mapping process could include cross-checking of findings and their validation with research participants. This should ensure that the most important issues have been covered and that the VCM represents the value chain in an accurate way. Do participants agree on the map? Is anything missing or misrepresented? If the answer is yes, these issues could be discussed in the group and possibly corrected. Keeping the research question in mind, the research team and/or the participants could summarize what has been discussed using the map to structure the discussion of findings. This form of discursive validation as well as 'group-visual synergy' (Chambers 2008) and triangulation can ensure the analytical rigour of the participatory mapping process (Holland 2013). Triangulation can involve different groups of research participants (e.g. within or across a case study) as well as different methods (e.g. interviews, focus group discussions). While a lot of the analysis and validation usually happens during the actual mapping exercise, it can be insightful to have a follow up discussion with research participants or others familiar with the research context. For example, in the Burkina Faso case, after completing the value chain mapping exercise and discussing it with the research team, a final discussion and verification exercise with research participants was undertaken.

FIGURE 11. THE VALUE CHAIN MAP WITH THE INFLUENCE OF ACTORS REPRESENTED BY THE NUMBER OF DISCS NEXT TO THE ACTOR CARD.

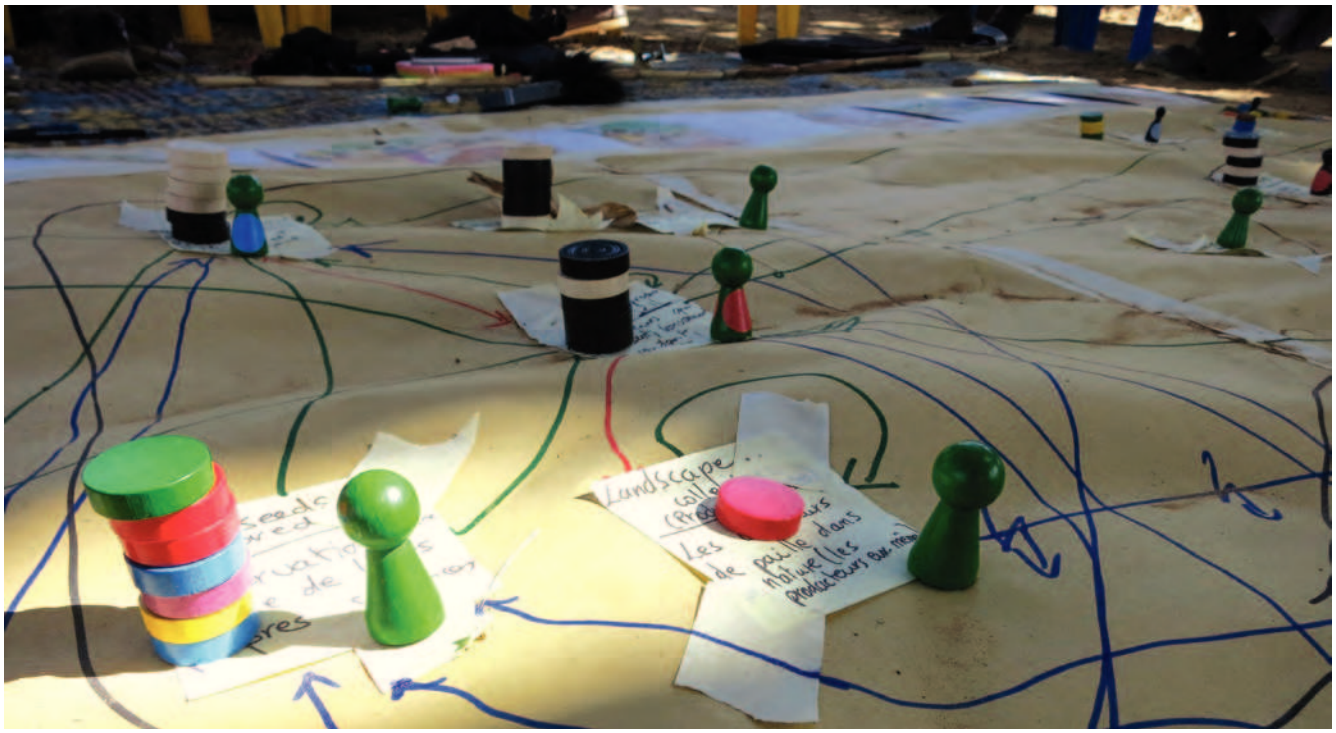


Photo: Christian Stein

FIGURE 12. DISCUSSION AND VALIDATION OF THE VALUE CHAIN MAP WITH RESEARCH PARTICIPANTS.

Photo: Christian Stein

5.5. Identifying, ranking and upgrading strategies

The goal of value chain analysis and value chain mapping is to better understand the system in order to identify strategies for upgrading. The creation of the value chain map is important to make visible some of the complex connections in the system, thereby allowing research participants to have a structured dialogue about what interventions might be possible to improve the value chain, e.g. by reducing risks or increasing benefits for producers.

In the pilot study the focus was on mapping actors along the value chain. Nevertheless, upgrading strategies were also explored with research participants. During the discussion the value chain map functions as a boundary object that allows for a more focused conversation. In future studies, upgrading strategies could be ranked according to different criteria using participatory statistics such as matrix scoring.

Table 1 in the annex summarises the main steps involved in the processes of creating a value chain map. The sequence of the steps is not necessarily linear, but can be iterative. Depending on the goals of a VCA, not all the steps are necessary and/or more steps could be added.

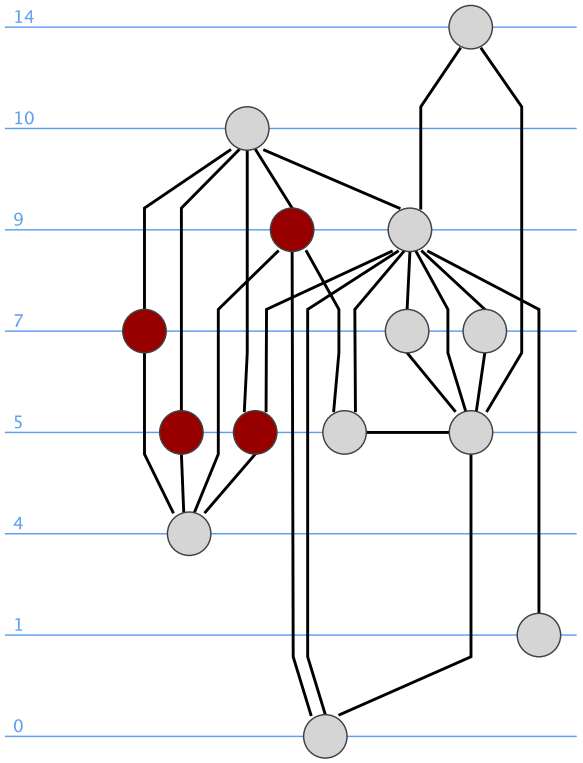
5.6. Data analysis

The value chain mapping process presented here generates a variety of qualitative and quantitative data. The value chain map visually documents the relevant analytical dimensions. While the value chain map is important to describe and document the complexity of the value chain, it is largely through the discussion of the VCM with research participants that relevant dynamics can be better understood. As well as the actual value chain map, it is therefore important to record the stories that participants tell about the functioning of the value chain. These help improve understanding of what challenges and opportunities exist.

One of the advantages with the value chain mapping approach presented here, and participatory research in general, is that the analysis and validation of the data can take place in collaboration with the research participants. Further analysis by the research team needs to be done after the data collection has been completed. However, the real power of participatory research is to give people that know their situation the best, the ability to share their insights and voice their perspectives.

The analysis of participatory numbers may simply involve adding up the numbers for an analytical dimension and then creating a summary table or visualisation that facilitates comparisons or drawing conclusions. For example, the number of discs representing each actor's influence can be visualized by drawing actors proportional to their influence in a digitalized network map or by creating an overview table. Figure 13 shows the network of value chain actors from one of the communities in Burkina Faso, using what is known as

FIGURE 13. POSITION OF ACTORS ACCORDING TO THEIR RELATIVE INFLUENCE WITH DIFFERENT TRADERS HIGHLIGHTED IN RED.



Source: Authors illustration

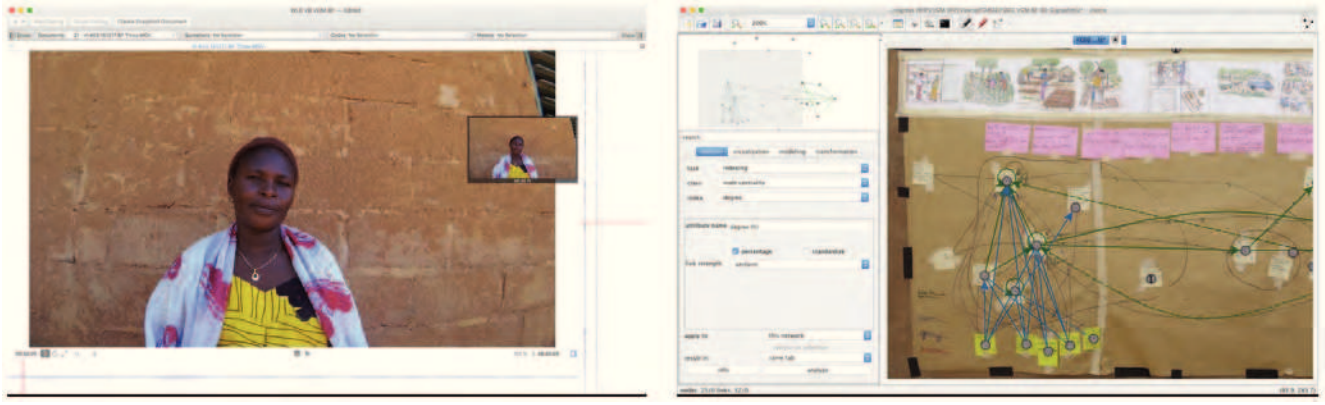
a 'status layout'. This positions actors according to their relative influence. Actors with the same influence value are arranged on horizontal lines. Actors with higher value are closer to the top and actors with lower value are closer to the bottom of the drawing. Traders are highlighted in red, allowing for quick comparison of the relative influence of several types of traders operating in different localities.

The numerical data generated using participatory research methods can be suitable for standard statistical analysis if the research design is appropriate. In such cases, Barahona and Levy (2003) suggest that the first stage of statistical analysis should be exploratory, using simple descriptive statistics or frequencies for categorical data, but more complex methods for statistical analysis are possible (see Barahona and Levy 2007). There may be issues about sample size and ability to generalise, but these are no different from studies using other methods. One of the advantages of participatory numbers, is that narratives from research participants can help explain results from the statistical analysis.

The analysis of participants' narratives can take different forms and may involve different levels of sophistication. At the end of the mapping exercise, research participants or facilitators can summarise key findings, using the VCM to structure the presentation of findings. It is important to ensure that these stories and the interpretation of the value chain map, are representative for the group as a whole and not dominated by a few individuals. This does not mean that consensus must always be reached, as differences and contestations can also be informative. For example, multiple interpretations of the value chain and associated system dynamics can highlight how change can happen or what hinders progress (Burns and Worsley 2015).

After the mapping exercise is completed, members of the research team could come together, compare their notes and check if they have arrived at a common understanding of the VCM. This is particularly helpful when it is done shortly after the mapping exercise, e.g. that same evening or the next day, when impressions are still fresh. If the value chain mapping process has generated rich narrative accounts, that are documented through field notes, audio or video recordings, then further analysis after the data collection might be warranted. Qualitative data can be transcribed and then coded manually or with the help of quantitative data analysis software such as Atlas.ti or Nvivo. Furthermore, if the value chain has many linkages and hence resembles more of a network than a chain, some basic network analysis measures, such as path length or actor centrality, can be insightful to identify patterns in the data that would be difficult to detect otherwise (cf. Cross et al. 2002).

FIGURE 14. ANALYSIS OF A VIDEO RECORDED INTERVIEW (LEFT) AND DIGITALIZATION OF A VCM USING NETWORK ANALYSIS SOFTWARE (RIGHT).



6. FINDINGS FROM A PILOT STUDY ON FODDER VALUE CHAINS IN BURKINA FASO

The mapping process resulted in a visual documentation of the value chain as understood by research participants, and rich narratives about the functioning of the value chain. Both the paper based version drawn by community members (see Figure 7 to 11 above) and the digitalized version (see Figure 15 below) capture the key elements and analytical dimensions from the mapping canvas (see Figure 5 above) that guided the value chain mapping and analysis.

In Figure 15, the top depicts the *value chain context* with enabling and constraining factors as identified by the research participants. In the middle the *value chain activities*, associated *value chain actors*, and the linkages between actors are shown. *Value chain linkages* include both horizontal collaborative relations within the community (red) as well as vertical fodder transitions between actors in different segments of the value chain. Supporting actors, such as local NGOs and extension services are shown at the bottom of Figure 15.

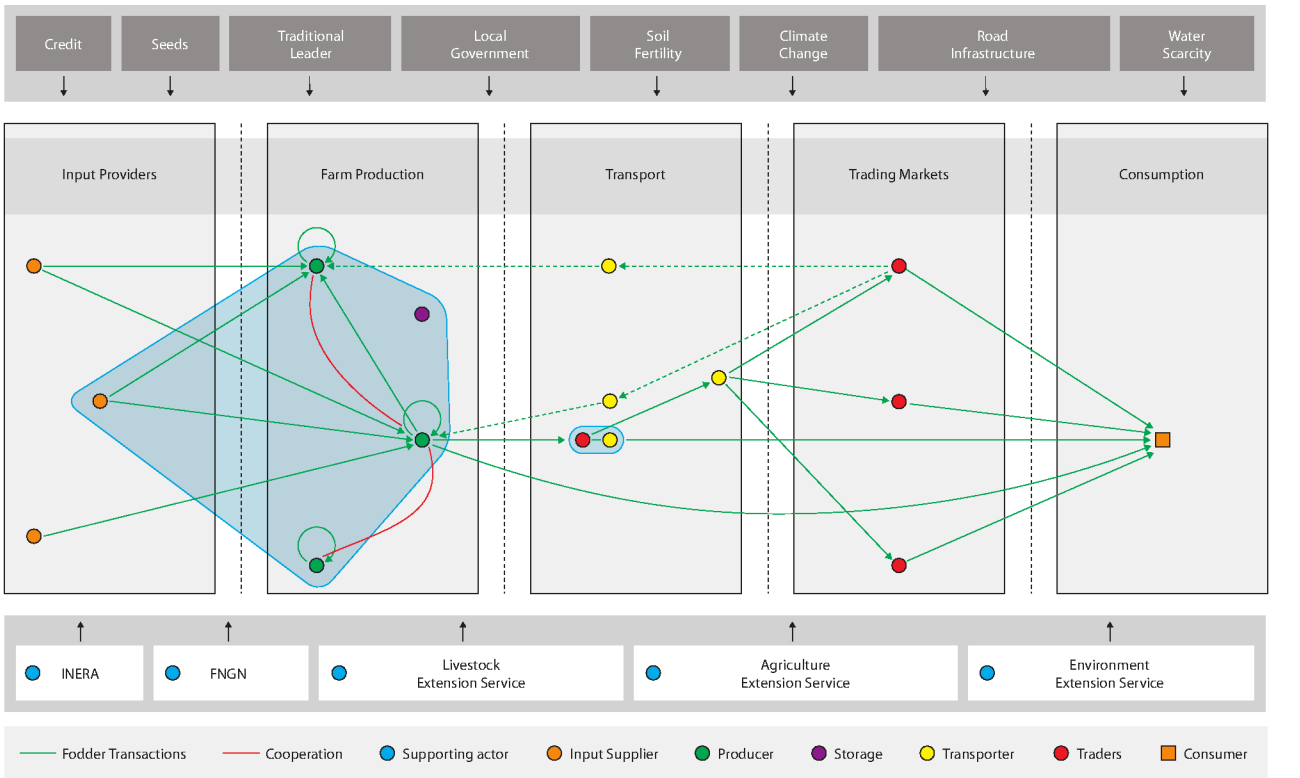
6.1. Temporal dynamics in the Sahel: seasonality of fodder flows

The mapping highlighted the importance of temporal dynamics in the Sahel. Rainfall variability shapes biomass availability in the landscape. Consequently it influences fodder market transactions and the strategies of actors within the analyzed fodder value chains to cope with changes in the availability of fresh or dried fodder, fluctuations in prices, etc.

In mixed crop-livestock systems, farmers are often producers and consumers of fodder at the same time. The value chain mapping revealed that fodder flows both from producers to markets as well as vice versa from markets to producers depending on seasonal biomass availability as well as access to markets, transport and facilities to process and store fodder. When biomass is abundant in the landscape, community members sell fodder to traders and/or nearby markets, depending on the availability and cost of transport (arrows to the right in Figure 15). During the dry season, community members sometimes buy fodder for their animals and therefore the flow of biomass along the value chain can reverse the direction (dotted arrows in Figure 15).

Strategies to better cope with temporal dynamics are important for fodder producers to reduce risks they face and/or increase the benefits of participating in fodder value chains. The research from Burkina Faso illustrates the importance of considering seasonal changes and temporal dynamics when studying value chains. The methodology presented here is well suited to integrating such dynamics. For example, by capturing changes in biomass flows and associated prices during different points in the year using participatory statistics.

FIGURE 15. THE DIGITALIZED VALUE CHAIN MAP AS DRAWN BY A COMMUNITY IN OUAHIGOUYA.



Source: Authors illustration

6.2. Mapping actor networks: making invisible work visible

Within a relatively short time, the research participants were able to paint a coherent picture (i.e. map) of how the fodder value chains function in their respective communities and how a variety of actors are embedded in those value chains.

The two communities had different levels of market access. While the community in Thiou had a small village market and good road access to a larger market, the other community in Pogoro-Silmimossin experienced challenges in selling and buying fodder due to poor road conditions and the cost of transport. The community with better market access also had a more developed and differentiated fodder value chain with specific institutions and actors for the collection of fodder as well as facilities for processing and storage. In both communities, upstream value chain activities close to the production segment (e.g. harvesting, processing, storing) are mostly done by the producers themselves but occasionally also collectively within the community.

Especially during times of crisis, horizontal cooperative linkages seem to play an important role in the two communities. Horizontal linkages within the community include relationships of solidarity, where community members help each other when there is a shortage of fodder, but also include mutually beneficial exchange relations, such as fodder for manure. In contrast producers' linkages to actors further down-stream in the value chain (e.g. traders, transporters) are rather characterized by market or 'arms-length' relationships, where fodder is exchanged for cash.

The use of visual research approaches has proven useful in building up a shared understanding within the community as well as between the community and the research team. In a country that has one of the lowest literacy rates in the world, visual research approaches seem highly relevant when conducting research with, and learning from, local communities.

6.3. Upgrading strategies: local perspectives on fodder value chains

Priorities for intervention are mainly seen by the communities in relation to inputs for production and productivity. The two communities identified knowledge about farming techniques and access to inputs as the two main challenges to improving fodder production and ultimately fodder availability. The community identified two priorities for improving fodder production. These were; enabling access to farming inputs, especially fodder seeds that are adapted to the challenging growing conditions in the Sahelian agro-ecological zone, in combination with training on production techniques.

During discussion of the fodder value chain maps with the communities, it became evident that upgrading strategies often go beyond the means available to community members. It is therefore necessary to consider contextual factors and the potential role of supporting actors for upgrading fodder value chains. At the moment, a few associations and NGOs (i.e. supporting actors) are involved in capacity building. To unlock the potential of fodder value chains in the study area, extension services, associations, NGOs and local government would need to play a stronger role and better coordinate their development efforts.

7. CONCLUSIONS

Value chain mapping can be an important means to better understand what opportunities and/or constraints producers face if they are to benefit from participating in value chains. The combination of value chain mapping with visual network research approaches and participatory statistics, has the potential to complement existing value chain analysis approaches and to generate new insights that would be difficult to obtain using traditional questionnaire surveys alone.

The pilot study from Burkina Faso illustrates the feasibility of co-generating valuable insights about complex and dynamic fodder value chains together with local stakeholders, including:

- Data collection can be timely and cost effective, using simple materials during participatory mapping to create a comprehensive description and documentation of a value chain and the actors involved.
- Research participants were able to draw a coherent picture (i.e. map) of how fodder value chains function and how actors are situated in those value chains.
- Visual research approaches have proven useful for collecting and analyzing data on complex issues in an engaging way.
- Participatory statistics helped generate numbers that are locally grounded, enabling the comparison of the influence of actors in the value chain.
- The mapping underscored the importance of temporal dynamics in shaping fodder transactions as well as the strategies used by actors to cope with those dynamics.
- Horizontal linkages within the community, play an important role during times of crisis when there is a shortage of fodder and community members help each other.
- Research participants perceived knowledge about fodder production and access to inputs as the main challenges for improving fodder production and ultimately fodder availability.
- The value chain mapping also revealed that developing fodder value chains and improving fodder availability requires access to resources and networks that are often beyond the reach of local fodder producers.

The mapping approach presented here links value chain mapping to participatory statistics and visual network

research. While these approaches have distinct traditions and differences, there are also numerous overlaps and opportunities for drawing insights and inspiration from these different strands of literature and research practices. Participatory statistics, visual and network research can complement other research approaches such as interviews and questionnaires commonly applied in value chain analysis.

The creative combination and methodologically sound integration of various existing qualitative and quantitative research approaches provide interesting opportunities to grapple with complex systems such as value chains. Participatory and visual research approaches also allow local people that have unique and context specific knowledge to inform project planning and policy. Developing methodologies can take time, patience and creativity. Allowing time for the development and testing of methodological innovations in the early stages is a necessary condition for quality, speed in later applications, and overall cost-effectiveness. The kind of participatory and visual research methods presented here are not yet in the mainstream of professional practice, but they have the potential to inform policy and practice in significant ways.

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ANNEX

TABLE 1 SUMMARY OF THE MAPPING PROCESS.

	STEPS	TASK	GUIDING QUESTIONS
	STAGE 1	**DRAWING THE VALUE CHAIN MAP**	
1	Activities	Arrange value chain activities to provide an orientation on the map.	What activities are necessary from production to consumption?
2	Actor	Write actors on post-its and place them on the map.	Who are the key actors involved in the value chain?
3	Links	Draw different types of linkages between actors.	What links are important to understand how the value chain operates?
4	Context	Write contextual factors on sticky notes and place them on the map.	What factors outside the value chain are important to consider?
	STAGE 2	**ANALYZING & INTERPRETING THE VALUE CHAIN MAP**	
5	Participatory statistics	Quantify analytical dimensions using participatory statistics.	What analytical dimension(s) would benefit from participatory numbers?
6	Validation	Summarize, discuss and triangulate emerging findings.	Does the map represent participant's reality adequately?
7	Upgrading strategies	Identify and rank upgrading strategies.	What upgrading strategies are most effective to increase the benefits and reduce risks for participating in the value chain?

RESEARCH PROGRAM ON Water, Land and Ecosystems

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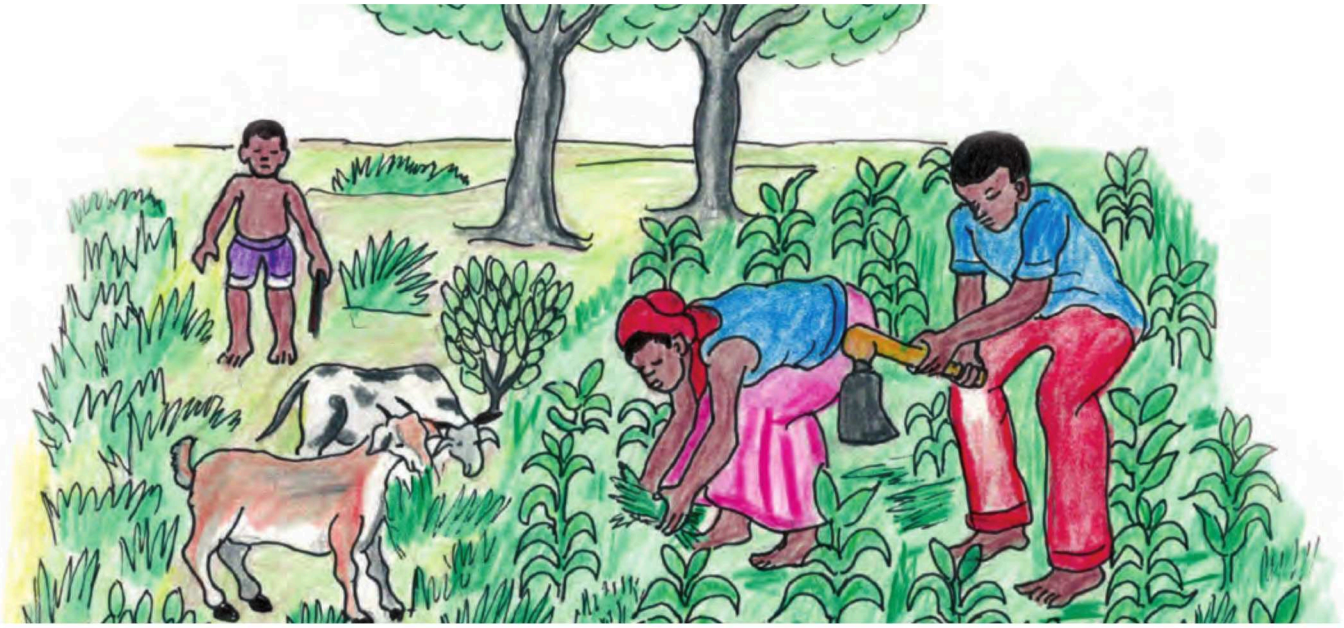

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