WFP World Food Programme

vam food security analysis

Market Analysis Tool

How to Conduct a Food Commodity Value Chain Analysis?

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Note

This guidance sheet is based on a literature review. As a 'living' document, the TGS is intended to be revised on the basis of lessons learned from the field application by WFP country offices. As such, those preparing a comprehensive market analysis to explore potential entry points in a market chain (e.g. local purchases, purchase for progress –P4P- or income generating interventions) may well find it useful to peruse the document to familiarize themselves with what VCA is about and how it can usefully provide information for decision making.

Technical Guidance Sheets
and other related resources are available at:
http://www.wfp.org/food-security

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Introduction: Purpose and scope of the technical guidance sheet

The overall purpose of this technical guidance sheet (TGS) is to gain a basic understanding of how the value chain analysis (VCA) of specific staple food commodities can benefit food security analysis, especially in contexts where staple food crop producers seem not to gain substantial income from their production.

The specific purpose of this TGS is to provide guidance on how to conduct a practical value chain analysis of food commodities whose production, processing, commercialisation and consumption is crucial for household food-security to WFP Country Offices engaged in comprehensive food security and vulnerability analyses (CFSVA), in-depth emergency food security assessments (EFSAs) or specific assessments of local purchase opportunities (e.g. P4P) and their impacts on poor and vulnerable stakeholders (e.g. small farmers and traders). Although they will not always be expected to conduct a VCA, WFP field staff will increasingly be requested to prepare terms of reference and oversee such analyses in the context of the widening of food assistance tools since the adoption of the new corporate Strategic Plan (2008-2013). It is therefore important to be aware of what a VCA entails.

This TGS defines what a VCA is and how the implementation of a value chain analysis can fit with and benefit the food security analysis framework used by WFP. ***Given their importance, gender concerns are highlighted throughout this guidance sheet to the extent possible[1].***

VCA is a necessary complement to food security analysis, since it assesses natural and economic assets, household food production systems, and then explores the links with household food security and livelihoods for decision making. It takes into account all the contextual information described in the food security analysis framework, i.e. (i) agro-ecological conditions, (ii) economic conditions, and (iii) market access and marketing/sales information.

Part I deals with the basic concepts of VCA.

Part II presents VCA tools and the step by step implementation of the tools.

Part 1 Key Insights from Value Chain Analysis

1. What is value chain analysis -VCA?

A value chain (VC) can be defined as the full range of activities that are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services); delivery to final customers; and final disposal after use[2]. In the context of food production, these activities include farm production, trade and support to get food commodities to the end consumer (e.g. transport, processing). The VCA extends traditional supply chain analysis by identifying values at each stage of the chain. It is called a value chain because at each stage of the supply chain, value is being added to the product or service as it is being transformed.

The VCA is therefore built on a market system (in particular a supply chain), detailing both structural and dynamic factors that affect the contributions of each actor to the chain.

Structural factors include:

- The **characteristics of a food commodity** (e.g. price, quality, quantity…). The characteristics of the VCA are determined by the end markets (e.g. buyers).
- The **enabling environment** (laws, regulations, policies, norms, infrastructure…), or factors that either facilitate or hinder the functioning of markets, hence the movement of a product or service along its value chain.

[1] More details on how to mainstream gender in VCA can be found in Mayoux L. and Mackie G. (2009): *Making the Strongest Links: A Practical Guide to Mainstreaming Gender Analysis in Value Chain Development*, ILO at http://www.ilo.org/empent/Whatwedo/Publications/lang--en/docName--WCMS_106538/index.htm

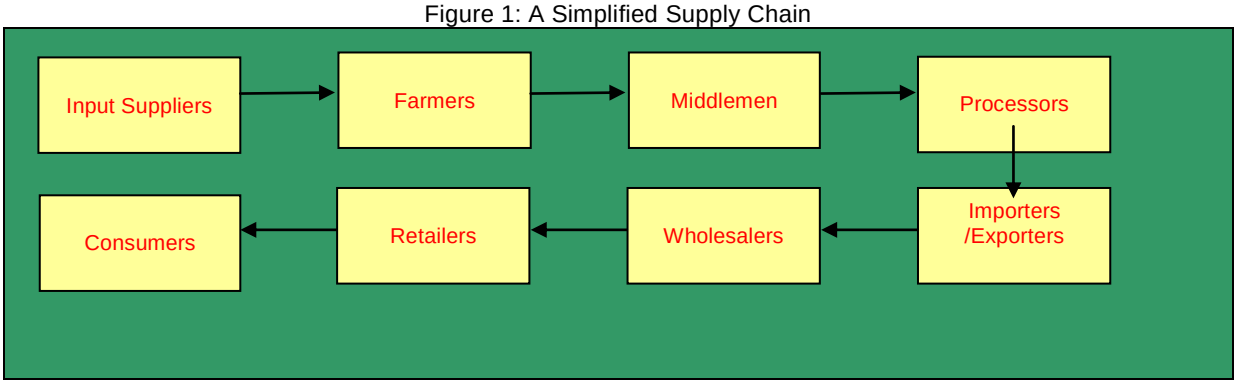
[2] Kaplinsky R. and M. Morris (2002): *A Handbook for Value Chain Research*, IDRC

- **Relationships** (i.e. formal and informal linkages and information flows) between the chain actors at different levels of the value chain. These relationships (particularly gender components) are critical for moving food commodities to the end users.
- Along the value chain, **supporting markets** (e.g. financial services, telecommunications, irrigation equipment, input delivery services, etc.) are critical to the development (investment, productivity growth, R&D) of the value chain.

Dynamic factors influencing value chain performance characterize how actors in the market system respond to the opportunities and constraints.

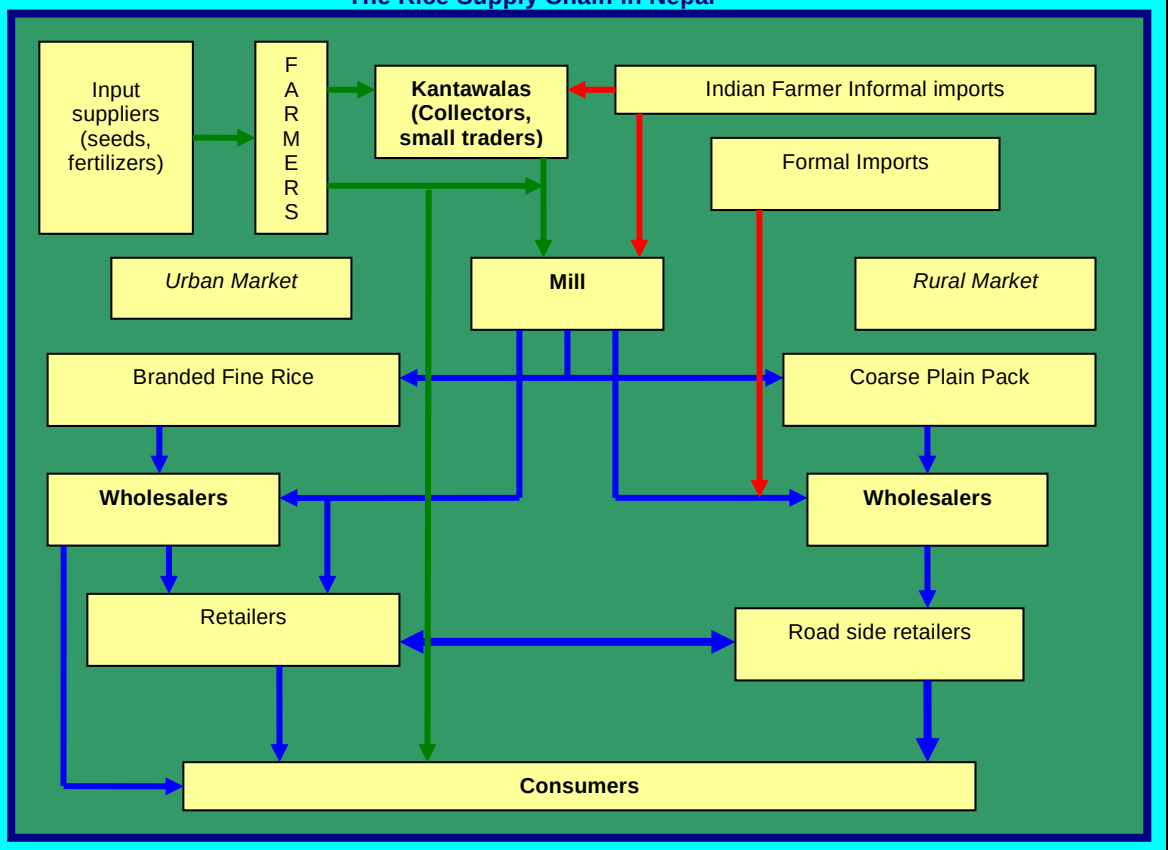
In a simplified food commodity supply chain, the actors include input suppliers, farmers, middlemen (including agents, assemblers/collectors, transporters…), processors, wholesalers (including importers and exporters), retailers and final consumers (figure 1).

Figure 1: A Simplified Supply Chain



In reality, supply chains can be more complex than the above. There tend to be many more forward and backward links in the chain as illustrated in Box 1.

Box 1
The Rice Supply Chain in Nepal



In Nepal, rice is sourced both domestically (green arrows) and from imports (red arrows). The rice supply chain includes farmers, rice millers, importers, wholesalers, retailers and consumers. Except for a small number of large farmers, the majority of farmers are smallholders, with only small quantities of their production being marketed. Farmers buy inputs from seed, chemical and fertilizer suppliers and sell their produce to vendors at the farm gate, *kantawalas*, or millers at the farm gate, local

markets, or processing facilities. *Kantawalas* constitute a major link between farmers and the mill, as they purchase rice from farmers for processing. Most *kantawala* collection depots are located in rural areas and/or along the border, the latter allowing k*antawalas* to also buy significant quantities of Indian produce.

Together few wholesaler/millers control the trade of cereals in general. Rice millers hold a central position in this process (blue arrows). Micro mills, with a processing capacity of about 1 MT/day, are generally found in the interior part of cities and in villages with larger settlements. These units are used to i) process rice for farmers for their own consumption or ii) process rice for small traders who sell directly to the market. Small mills are located in larger settlements with large production areas and either process farmers' rice for a fee or buy raw materials for their own sale/delivery to retailers. Medium and larger mills have a capacity of 1-1.5 MT/hour and account for more than 80 percent of traded rice in the market. A dozen of them based in the Terai region supply more than 50 percent of the rice in Kathmandu and other major markets. Medium and larger mills function in an oligopolistic market structure with a relatively large number of counterpart suppliers and buyers.

Milled rice importers based along the Indian border provide supplies to wholesalers. Most wholesalers tend to cover higher levels of markets (i.e. district/regional/national/international). Rice wholesaling is largely company-led, with no organized wholesale facilities, except for *"GoI"* in Biratnagar. In addition, it can be noted that the larger miller/traders mentioned above are also directly involved in the marketing of rice. Retailers get their supplies from wholesalers and sell directly to consumers on the road side in rural areas or on local markets.

Source: Adapted from, WFP/FAO (2006): Food and Agricultural Markets in Nepal, Final Report, August, Kathmandu

The concept of value chain encompasses the issues of organization and coordination; the strategies and the power relationship (including gender concerns) of the different actors in the chain[3]. The value chain concept:

- Traces product flows and shows value additions at different stages
- Identifies key actors and their relationships in the chain.
- Identifies enterprises that contribute to production, services and required institutional support.
- Identifies bottlenecks preventing progress.
- Provides a framework for sector-specific action.
- Identifies strategies to help local enterprises to compete and to improve earning opportunities.
- Identifies relevant stakeholders for program planning (also in distant markets).

Conducting a VCA requires a thorough assessment of the dynamics amongst the actors in a chain, what keeps these actors together, what information is shared, how the relationship among actors is evolving, etc.

There are three key features that help to understand the relevance of the value chain to food security analysis and related work:

- **Location**: The activities are often carried out in different locations of a country or even the world;
- **Value**: Some activities add more value than others, and;
- **Power**: Some actors in the chain have power over the others.

A central concern of VCA is to "unpack" the relationships between lead actors (i.e. those with power) and others – and the opportunities and constraints that result from entering such relationships. The main interest for WFP Food Security Analysis is to understand where the poor and/or food insecure households might stand along this chain.

2. How does a VCA fit with the food security analysis framework?

The **three main pillars of the VCA, namely production, processing and marketing of the produce**, are the main aspects that relate directly to the food security framework.

The analysis of production falls into the first and the second dimensions of the food security framework, i.e.: 1) the livelihood assets which are focused on natural, physical, economic/financial, capital and human assets and, 2) livelihood strategies including household food production, income generating activities, transfers, loans, savings…

Livelihood assets and strategies are interlinked, *inter alia*, with the agro-ecological, social, political, and economic and market conditions. Understanding the farming situation of a specific area helps understand the role that the quantity/quality of the harvest and the type of farmed crops play as potential income generating activity. The analysis of the processing systems of specific staple food

[3] USAID (2009): *Global Food Security Response: West Africa Value Chain Analysis Protocol*, microREPORT No.153, February.

commodities can improve the understanding of the profitability of an income generation or rural business development activity (IGA/RBD), i.e. the returns on investments, which can help poor rural households be endowed with sufficient financial capital to ensure their food security. These are fundamentally dependent on markets and their proper functioning. As highlighted in the Technical Guidance Sheet on "How to conduct a trader survey"[4], understanding market functioning helps understand *the causes of inadequate food consumption which may be related to the purchases and the sales on the market of households or if cash, vouchers or food may be a desirable response strategy from a market perspective.*

The VCA also helps understand the business relationships among different chain stakeholders, the price formation, determination of margins and the trends in prices. In general, understanding production and consumption patterns of the weakest actors of the supply chain of a specific food commodity is crucial in emergency/post-emergency situations as they are often also food insecure. Gender disparities and inequalities are often critical to understanding and addressing the 'weakest links' within value chains, and the most critical areas of interventions. The analysis of the role of the actors in the supply chain, i.e. *inter alia* their access to markets and their purchasing and bargaining power, and the determination of their **profit margins** will help the analyst understand the constraints and bottlenecks to the incomes they could potentially be earning from their main livelihood activity. This will in turn help to identify the need for specific interventions.

In summary, VCA is useful for food security and vulnerability analysis because *it helps to determine whether the market system – through which households sell their surplus food commodities, and through which they access basic staples and production inputs – is competitive, efficient and reliable*[5]. It fits into the food security framework, insofar as it helps to determine the marketing constraints and opportunities for households as buyers and sellers. Staple food VCA can help improve the understanding of the:

- Socio-economic and livelihoods situation of target groups;
- Production situation of target area, and;
- Market functioning and market relationships among the different chain stakeholders, including price formation, margins, trends in prices etc.

3. How does VCA help decision-making?

VCA is increasingly used in decision-making processes to enable poor households (small farmers, micro-entrepreneurs or target groups) to play a larger and more lucrative role in a particular value chain. In addition, VCA helps acquire a comprehensive understanding of what are often complex systems with multiple interdependent links. Each link in the chain is analysed in terms of the value added and the costs incurred.

VCA helps the policymaker and programme officer to find out:

- Where the bottlenecks are?
- Which part of the chain holds up progress?
- Which bottlenecks deserve priority attention?
- Who can be expected to address them?

Table 1 illustrates how VCA can help improve food security analysis and contribute to decision-making.

Table 1. How value chain analysis fits with food security analysis?

What does VCA help us do?	Why do we need to know this?
Understand the extent to which marketing inefficiency is a key constraint on household food security – either because it undermines the value of commodities sold, or because it contributes to high prices for commodities purchased.	Quantification of income and expenditure at baseline: **marketing constraints**; Coping capacity/response strategies: often the price of what people sell falls as demand declines just when supply increases. We need to get an understanding of **market chains** to determine the extent to which – considering these dynamics – coping strategies "fill the gap".

[4] Accessible at: http://www.wfp.org/content/market-analysis-tool-how-conduct-trader-survey

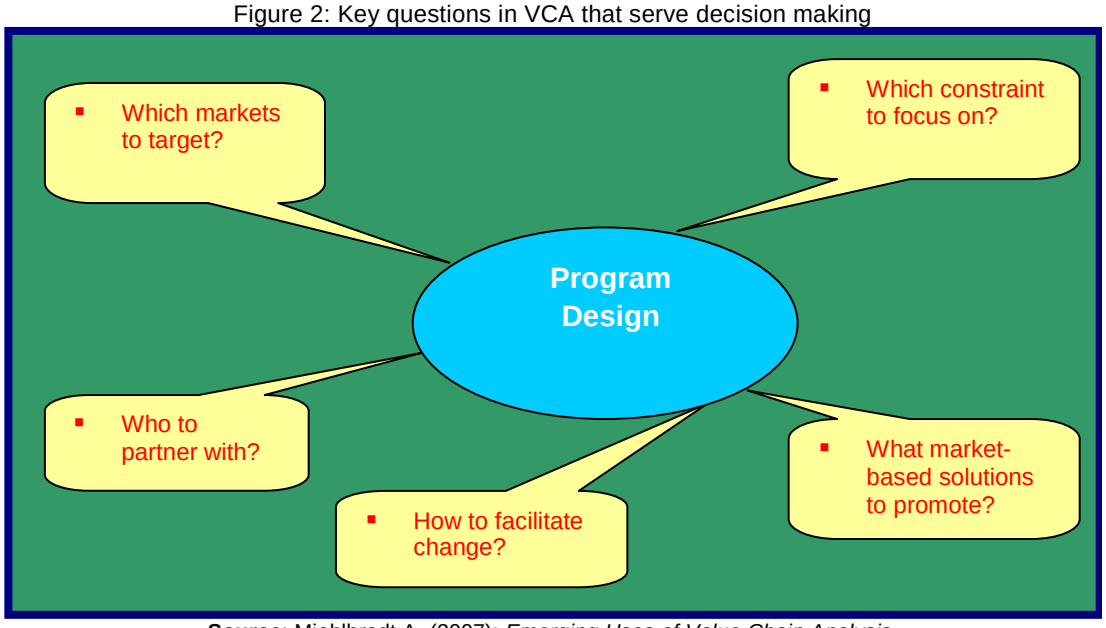
[5] RHVP, SCUK and FEG: The Practitioners' Guide to HEA, Guide 1: Participatory Market Chain Analysis. Accessed at http://www.feg-consulting.com/resource/practitioners-guide-to-hea/annexes-practitioners-guide/chapter-3/annex-c/Guide%201%20-%20Market%20chain%20analysis.pdf

Determine the likely **price and production cost** scenarios for staple foods (without intervention).	We need to consider if there have been any major changes to the market or policy environment that will result in different price trajectories from the past. The price estimates can be based on price trends in similar bad years in the past; otherwise we may look at current prices in source markets and estimate the final price for consumers after **marketing costs and profit** have been added. These prices can be compared with **import parity prices** of the same goods to decide on the potential for local purchases.
Determine the most efficient and effective way of addressing **food insecurity requires mapping of supply and demand areas and commodity flows** to guide the likely price for consumers for different intervention options.	If the supply/demand analysis identifies a surplus which should in theory be sufficient to fill the deficit, a value chain analysis helps us estimate the likely price at which the staple food may be sold in the deficit area (without market support) and whether any market support could remove/reduce bottlenecks in the market chain[6]. The challenge lies in the fact that **the intervention influences the price, which may, in turn, make the intervention either excessive or inadequate.**
Identify **opportunities that will support livelihood** recovery among disaster affected households' needs, taking into consideration the market demand for particular commodities.	The VCA may be expected to indicate opportunities where – if demand were addressed through a **cash transfer** or **institutional local purchases** – a market may be found. Getting an idea of where in the marketing chain constraints exist that can be addressed (e.g. lack of information about the supply of products is an obvious one) helps us clarify the scope and feasibility of these kinds of recommendations.

Source: Adapted from RHVP, SCUK and FEG: The Practitioners' Guide to HEA, Guide 1: Participatory Market Chain Analysis.

The analysis can then be used to identify opportunities for intervention, such as providing access to finance, markets or technology; or improving institutional or policy frameworks or the business environment. Ultimately these interventions aim to enhance the income generation of those who are not benefiting as much as they could from the added-value across the chain.

Figure 2: Key questions in VCA that serve decision making



Source: Miehlbradt A. (2007): *Emerging Uses of Value Chain Analysis*, 8th Annual Seminar on Developing Business Service Markets and Value Chains.

VCA is particularly useful within the scope of P4P baselines, market assessments for cash/voucher transfer modalities and specific studies on the impact of value chains on food security and livelihoods analysis for vulnerable populations. VCA helps determine the most efficient and effective way of implementing food market-based interventions (e.g. P4P or more generally local procurement opportunities, and cash/voucher transfers) to support livelihoods and food security through the mapping of supply and demand areas, trade flows, strengths and weaknesses of and values accrued by each supply chain actor.

[6] Examples of market assistance and support options are given in the EFSA Handbook on pages 201 to 203. The handbook is accessible at: http://www.wfp.org/content/emergency-food-security-assessment-handbook.

It is important to note that value chains are constantly shifting due to broader economic changes, so that VCA provides only a snapshot that can help identify possible points of intervention. Monitoring of the impacts of interventions is therefore necessary to assess changes from a baseline VCA.

Part II: VCA Step by Step

4. What are the principles and aspects to consider when conducting a VCA?

According to the DFID funded project on *Making Markets Work Better for the Poor* (M4P), VCA applied to staple food commodities can be built on four aspects[7]:

- ***Systematically mapping the actors*** participating in the production, distribution, marketing, and sales of a particular product (or products). This mapping assesses the characteristics of actors, profit and cost structures, and flows of goods throughout the chain, employment characteristics, and the destination and volumes of domestic and foreign sales. Such details can be gathered from a combination of primary survey work, focus groups, PRAs, informal interviews, and secondary data aspects of value-chain analysis as applied to agriculture.
- ***Identifying the distribution of benefits of actors in the chain***. That is, through the analysis of margins and profits within the chain, one can determine who benefits from participation in the chain and which actors could benefit from increased support or organization. One can supplement this analysis by determining the nature of participation within the chain to understand the characteristics of its participants.
- ***Examining the role of value and quality upgrading within the chain***. Upgrading can involve improvements in quality and product design that enable producers to gain higher value along the chain or diversification in the product lines served. An analysis of the upgrading process includes an assessment of the profitability of actors within the chain as well as information on constraints that are currently present. Governance issues play a key role in defining how such upgrading occurs. In addition, the structure of regulations, entry barriers, trade restrictions, and standards can further shape and influence the environment in which upgrading can take place.
- ***Highlighting the role of governance in the value-chain***. Governance in a value-chain refers to the structure of relationships and coordination mechanisms that exist between actors in the value-chain. Governance is important from a policy perspective by identifying the institutional arrangements that may need to be targeted to improve capabilities in the value-chain, remedy distributional distortions, and increase value-added in the sector.

To the extent possible, all information collected should be gender-disaggregated and gender difference included as a dimension of the analysis.

5. Core VCA tools

The core tools developed by DFID for a VCA can contribute to shedding light on food security and livelihoods of poor and vulnerable households. Table 2 shows the various dimensions of VCA and the tools that could be utilized to analyze those dimensions in the context of food market-based programming. The greater the number of ticks, the more relevant the tool is for analyzing that particular dimension. As such each tool can be applied independently to shed light on a particular dimension of the value chain, though it is advisable to combine the tools in order to get a comprehensive understanding of the value chain.

Table 2. Tools for analyzing various dimensions of the value chain

	Tools			
	Tool 1	Tool 2	Tool 3	Tool 4
Dimension	**Value chain identification**	**Mapping**	**Margin/Cost**	**Technology Knowledge Upgrading**
Participation of the poor	X	X		X
Employment + Working environment	X	X	X	XX
Wages + Income	X	X	XX	
Access to assets	X	X	X	XXX
Access to information + Technology	X	X	X	XXX

[7] DFID (2008): *Making Value Chain Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis*.

Access to infrastructure	X	X		X
Access to services	X	X		
Security and vulnerability	X	X	X	X
Empowerment	X	X		

5.1 Tool 1. How to identify value chains of interest?

The identification of value chains of interest is the starting point of any VCA, unless the choice is made *a priori* for some reasons.

Objectives

Prior to undertaking a VCA, a decision needs to be made on which sub-sectors, products or commodities should be prioritised for analysis. As resources for undertaking analyses will invariably be limited, a method needs to be devised to select a limited number of value chains to be analysed amongst the numerous choices available.

Key Questions

- What are the key feasible criteria on which to base the selection of value chains to be analysed?
- What potential value chains could be analysed based on the chosen criteria?
- After applying the selection criteria, what are the value chains that are most appropriate to analyse?

The prioritising process follows 3 main steps: (i) determining and ranking a set of criteria to be used to prioritise the value chains; (ii) determining the potential sub-sectors, products or commodities that could be considered, and; (iii) then constructing a matrix to enable ranking of the products according to the criteria. The final priority can be determined on the basis of the ranking obtained.

Steps

- ***Step 1: Determine and prioritize criteria***

VCA starts with the selection of a value chain. The decision about which value chain to analyse depends on the criteria utilized to select the value chain. The first step to make the prioritisation of value chains is to decide what criteria to utilise to make the ranking. **The choice of criteria is strongly related to the main purpose of the VCA. As the key purpose of the VCA proposed in this TGS is poverty and food insecurity alleviation, the criteria will be selected accordingly**. Some potential criteria (not exhaustive) that are suitable for potentially achieving pro-poor outcomes are listed below:

- *Poverty sensitive*
  - Poverty and/or food insecurity incidence (absolute figures if available by sex)
  - Present integration of the poor in the market (commodities produced, sold and bought by the poor, food insecure households and by sex)
- *Socially inclusive*
  - Gender differences in the supply chain (women/men employment rates by gender if possible in production, processing and marketing)
  - Low barriers to entry for the poor (capital, knowledge)
  - Involves a large number of people (by sex)
- *Scalable*
  - Growth potential of certain products/activities
  - Potential for leveraging public investment with private investment
  - Potential of the product/activity for poverty reduction
  - Potential for Labour Intensive Technology
- *Low risk*
- *Environmentally sustainable*
- *Policy compliant*
  - Within framework of national and regional strategies and policies
- *Etc.*

To the extent possible, the determination of selection criteria and their ranking should be done with key stakeholders such as local policy and decision makers, farmers, private sector actors, service providers, development organisations and community representation groups.

It is unlikely that all of the criteria selected will be considered to be of equal importance in the decision of what value chains to analyze. Some criteria will be considered to have a higher level of importance in the decision making process and therefore should have a greater influence on the ranking of value chains. The way to achieve this is through a system of weighting, where different criteria are assigned a different numeric value to be utilized during the ranking process. The differing numeric values assigned reflect the relative importance of the criteria. **Regardless of which weighting system is utilised, a general rule of thumb is that the more pro-poor you wish the selection of value chain to be, the higher the weighting that should be given to the criteria that emphasize pro-poor characteristics** (see step 3).

- ***Step 2: List potential products/activities***

Once the criteria for selection of the value chains for analysis have been identified and weighted, the next step is to determine a list of all the potential value chains/products/commodities that could be considered in the geographic area under consideration. **The value chains identified are usually based on products that are already produced and/or most consumed in the area**, products that can be grown in the area.

- ***Step 3: Matrix ranking of products/activities against the criteria***

Once criteria and weighting have been decided and potential value chains have been identified, the next step is to make a matrix (a table) containing the criteria and the value chains. A suggested format is shown in the following table:

Criteria	Relative weight (%)	Ranking		
		Value chain 1	Value chain 2	Value chain 3
Criteria 1	50%			
Criteria 2	20%			
Criteria 3	15%			
Criteria 4	10%			
Criteria 5	5%			
Total score	100%			

Once the matrix is made, the analyst then makes a ranking for each value chain in terms of how well each value chain conforms to the criteria (see example in box 3). A common way of doing this is to have a numeric ranking of 1 to 5, where 5 can represent the minimum compliance with the criteria and 1 represents a maximum compliance. The assignment of the numeric scores can be done in a number of ways, including gathering numeric rankings from all participants in the stakeholder group and then making a simple average. **At the end of this exercise, it is recommended not to select more than 2-3 value chains, as the VCA for a single staple food commodity can be time and resource demanding.**

Box 3
Participatory Value Chain Selection Exercise

A priority setting exercise was carried out with stakeholders to evaluate two commodities (i.e. rice and cassava) against 13 criteria of which 5 criteria capture the dimension of poverty alleviation and sustainability against the backdrop of the national strategies, and 8 criteria capture the dimension of the value chain structure. Once the criteria were defined by the Steering Committee, the commodities were ranked against each criterion. A score of 1 meaning that the particular commodity best met that criterion, and a score of 5 meaning that the commodity did not meet that criterion (ranked against the other commodity) were assigned. The evaluation of each criterion was done through consensus of the steering committee. Once each criterion was evaluated, a simple average score was calculated, and the commodities ranked accordingly. The commodity with a lower score was ranked higher (see the table below). The results of the priority setting exercise indicated that rice was the most appropriate commodity for VCA.

Type of Impacts		**Rice**	**Cassava**
Poverty and Sustainability	Availability of natural resources	3	5
	Within framework of PRSP	3	5
	Potential for labour intensive technology	3	4
	Number of poor households involved in the sector	1	2
	Future potential	4	5
	Average	*2.8*	*4.2*
Structure of Chain	Extent of value adding potential (stability, profitability)	4	5
	Number of different products produced	5	2
	Length of marketing chain (number of intermediaries)	5	2
	Maturity of industry in the region	2	3
	Marketing potential	3	5
	Lack of previous research	5	3
	Data availability	1	3

	Potential for lessons learned/Replication of mechanism	2	4
	Average	*3.4*	*3.4*
Ranking		***3.1***	***3.8***

Source: Adapted from DFID (2008): Making Value Chain Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis.

5.2 Tool 2: Mapping the value chain

Ideally, the identification of value chains of interest is always followed by the mapping of each value chain.

Objectives

Mapping the value chain has three main objectives:

- Visualise networks in order to get a better understanding of connections between actors and processes in a value chain.
- Demonstrate interdependency between actors and processes in the value chain
- Create awareness of stakeholders to look beyond their own involvement in the value chain.

Key Questions

Deciding what to map depends on available resources and on the scope and **objective** of the analysis. A value chain has many dimensions: the actual product flow, the number and type of actors, the accrued value etc. It is therefore crucial to choose which dimensions to map. The following questions can guide what dimensions to map:

- What are the different (core) processing steps in the value chain?
- Who are the actors involved in these processes and what do they actually do?
- What are the flows of product, information and knowledge in the value chain?
- What is the volume of products, the number of actors, and the number of jobs involved (e.g. by sex)?
- Where does the product (or service) originate from and where does it go?
- How does the value change across the chain?
- How does the added value along the chain relate to the transformation/process in that particular point of the chain?
- What types of relationships and linkages exist?
- What types of (business) services are feeding into the chain?

Steps

- ***Step 1: Mapping the core processes in the value chain***

The first step is to find the core processes in the value chain. **This consists in trying to distinguish maximum 6-7 major processing (transformation) steps that the raw material goes through before it reaches the final consumption stage.** These core processes will be different, depending on the characteristics of the chain being mapped.

- ***Step 2: Identifying and mapping the main actors involved in these processes***

The second step deals with identifying the actors involved in these processes and their roles.

How to distinguish among actors depends on the level of sophistication the mapping exercise is trying to reach. The most straightforward distinction would be to categorize actors according to their main occupation, for instance, collectors are involved in collection, and producers are the ones that produce. This would be a starting point, but will only give the minimum information needed. An addition would be to categorize according to different typologies, such as:

- Legal status or ownership (government, registered enterprise, cooperative, household, female, male, etc.)
- Size or scale (number of people involved by sex, micro-small-medium sized enterprise, etc.)
- Poverty and/or food insecurity status ranking
- Location (commune, district, province, country, etc.).

It is important to note that one actor generally takes on different roles. For instance, a rice miller will also collect rice and act as input provider. Try to find out what the main occupation of this actor is and categorize accordingly.

At this stage, the result of the mapping of the value chain should result in an understanding of where there are gaps or redundancies, opportunities for value addition or expansion of existing activities. Breaking down core processes into specific detailed activities is only useful when we turn to analyzing costs, revenues and margins (see subsequent sections). The activities can be seen as the cost or profit centres of actors.

- ***Step 3: Mapping flows of products, information and knowledge***

The reason for the existence of a value chain is that goods, services or information are passed on between different actors. To find out more about this topic is the aim of the following core question: *What are the flows of products, information and knowledge in the value chain?*

Every value chain is defined by a number of inter-actor flows. These flows can be both tangible (products, services or cash) and intangible (information or knowledge). Distinguishing the flows is one of the main objectives of any VCA.

Mapping these flows can be quite straightforward when it comes to products, by following the stages that the tangible product goes through, from raw material to final product. This is especially relevant when we try to find out what components are used to come to a final product.

Intangible flows, such as information and knowledge, might be more complicated to capture in a visual map. Be aware that these flows are often going both directions. For instance, a trader tells a farmer about product requirements; a farmer gives the trader information about product availability. The role and position of the poor and vulnerable (e.g. food insecure households, small farmers, women, men…) is crucial in this part of the mapping: *do the weakest actors participate in the exchange of knowledge and information?*

- ***Step 4: Mapping the volume of products, numbers of actors and jobs***

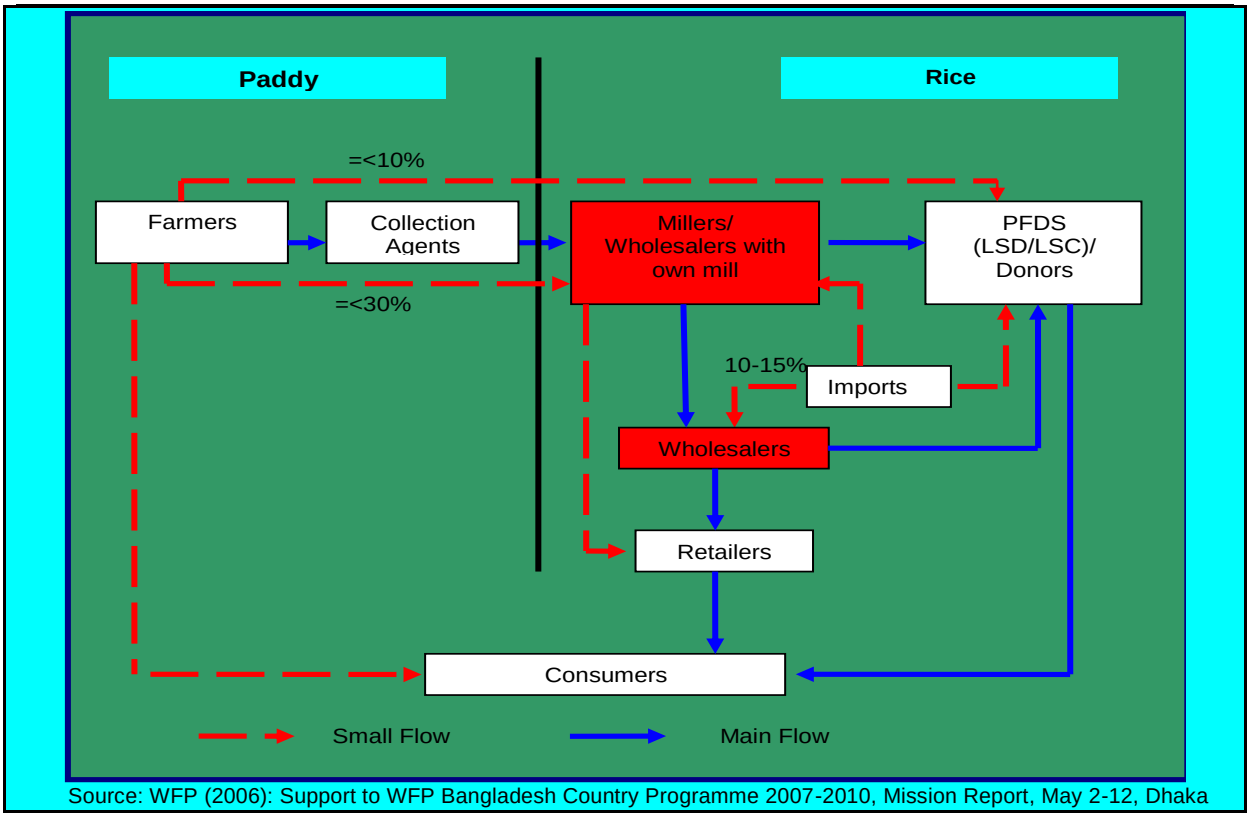
Some dimensions in value chain mapping can be quantified. Besides the monetary dimension, other dimensions can also be captured in numbers: *What is the volume of products, the number actors, and jobs?*

The first part, the volume of products, is closely related to mapping the product flow. We add the dimension of volume to tracking down the product throughout the value chain. The purpose of finding out about this dimension is to have an overview of the size of the different channels within the value chain (see box 4).

Box 4
An Example of Quantified Trade Flow Map

A WFP programme support mission was undertaken in 2006 to gain a better understanding of rice trade flows and to incorporate that knowledge into the Country Programme (CP) implementation strategy in Bangladesh. Key informant interviews indicated that more than two-third of farmers' sale is handled by millers through paddy collectors. The milled rice is sold either to traders or to the government of Bangladesh (GoB) through the public food distribution system (PFDS). GoB's depots are supplied by a network of 15,000 rice millers out of an estimated total of 20,000 (excluding informal millers). Rice sales and purchases from traders to retailers and consumers are conducted through the countrywide 60,000 market places (including Union and Village level markets). The rice market is more of a tertiary market with limited volumes flowing directly from farmers to consumers. Of about 27.3 millions tons produced in 2006/07, about a third was sold by farmers directly to wholesalers and about 10% was sold directly to public institutions. Collection agents are therefore the main bridge between farmers and traders. Rice imports (about 3 million tons, excluding informal border trade and 0.5 million tons of food aid) account for less than 15 percent of the sales of traders. Imported rice is distributed to millers, wholesalers and PFDS.

Actors' Contribution to Rice Trade Flow in Bangladesh



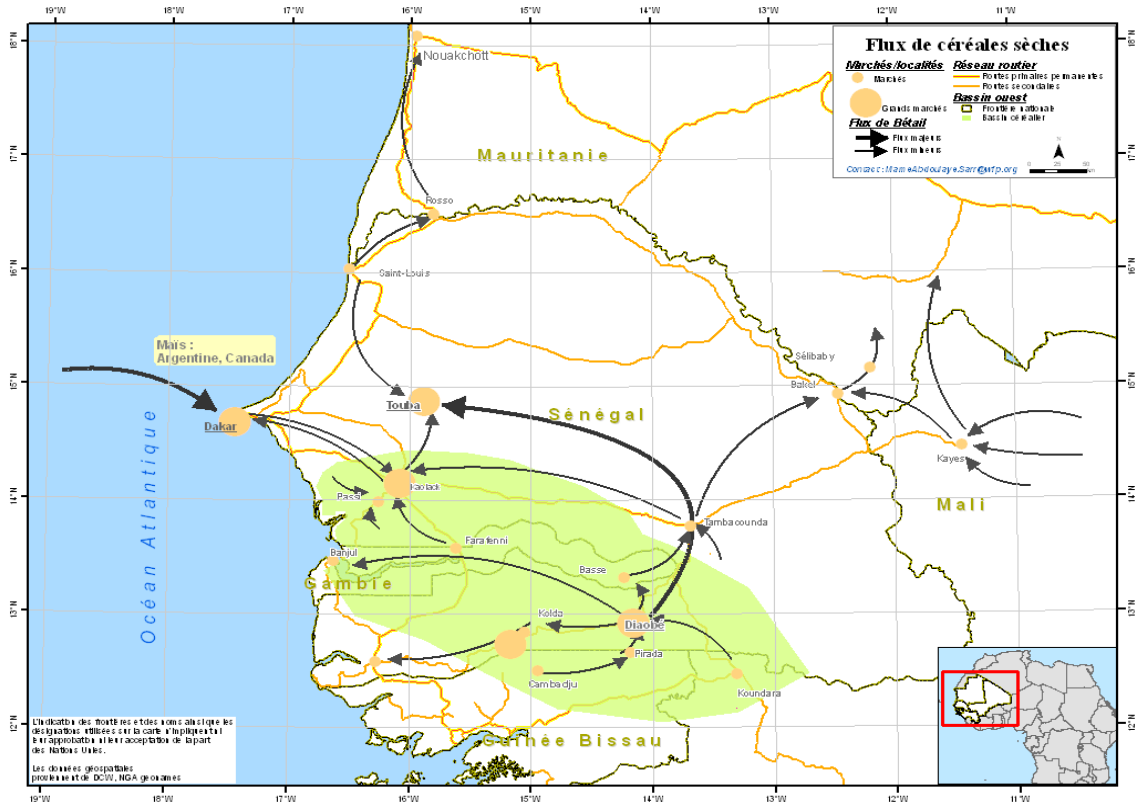
Source: WFP (2006): Support to WFP Bangladesh Country Programme 2007-2010, Mission Report, May 2-12, Dhaka

Two more dimensions that are quantifiable (and are closely related) are the number of actors and the employment opportunities they offer. Once market actors (farmers, cooperatives, state owned companies, etc.) have been classified, the actual number of these actors within the value chain is established. The number of poor (e.g. small farmers, food insecure households, women, men…), being a part of the actors in the different steps is a dimension that can be covered in this stage of the analysis (see box 5).

- ***Step 5: Mapping the geographical flow of the product or service***

A very straightforward way of mapping is to actually make a geographical map, following the trail of the product or service you want to map. Start at the place of origin (for instance where it is cultivated) and map how the product travels from intermediary trader to wholesaler, retailer and final consumer, including the sex of the actors. If possible you can use a map of the region and indicate the physical flow on it (e.g. figure 3). While making this kind of map to capture the product flow and show the location or regional differences, it is important in the final analysis to provide some insights into the volumes, margins and number of actors involved disaggregated by sex, to the extent possible.

Figure 3: Grain (millet, sorghum, maize) trade flows in the west basin of West Africa*



Source: WFP et al (2010): Cross-border trade and food security in West Africa, Dakar.
(*) The west basin includes Senegal, Gambia, Mauritania, Mali, Guinea-Bissau, Guinea-Conakry.

- ***Step 6: Mapping the value at different levels of the value chain***

Mapping the monetary value throughout the chain answers the key question: *How does the value change throughout the chain?*

Value can be measured in many ways, as shown in chapter 5.3 on costs and margins. The most straightforward depiction of a monetary flow looks at the value that is added by every step throughout the chain (see Box 5). Deducting the difference will lead to an overview of the earnings at the different stages. Other economic parameters are: revenue, cost structures, profit and return on investment.

The box shows that a small number of exporters earn more than any other actor of the cashew nut value chain in Guinea Bissau. Net incomes of small traders and wholesalers are comparatively low due to transaction costs, especially taxes.

Box 5
Marketing Margins for Raw Cashew Nuts (April 2007)

Market actors and Cost positions	Local Value/Unit (FCFA/kg)	Approx. Number of market players	Selling Area in km	Volume of transaction in kg or tons/year
Producer costs	105	60% of population	0.1km-5km	1kg to 1ton
Gross Margin	15			
% Gross margin in producer price	*14.3%*			
Small local Retailer	120	~500	0.1km -30km	1kg to 10tons
Transport	5			
Fiscal	5			
Storage	-			
Other	-			
Gross margin	*12*			
Local retail price	142			
% Gross margin in retail price	*8.5%*			
Regional Retailer	142	~50-100	>50km	1tons to 10tons

Transport	10			
Fiscal	5			
Storage	-			
Other	-			
Gross margin	*13*			
Regional retail price	170			
% Gross margin in regional retail price	*7.6%*			
Wholesaler	170	<10	>100km	>10tons
Transport	-			
Fiscal	19			
Storage	-			
Other	32			
Gross Margin	*25*			
Total wholesale price	246			
% Gross margin in wholesale price	*10.2%*			
Exporter Port Bissau (FOB)	246	3	Export to Cochin (India)	90t
Transport incl. Insurance (CIF)	53			
Gross Margin	*92*			
Port Cochin (India)	391	3		
% Gross Margin in export price	*23.5%*			

Source: Adapted from, WFP (2007): Joint Cashew Market and Food Security Review, Guinea Bissau.

- ***Step 7: Mapping relationships and linkages between value chain actors***

Relationships can exist between different process steps (e.g. producer and trader) and within the same process (e.g. farmer to farmer). Furthermore, the nature of these relationships can be of crucial importance to determining factors such as bargaining power within a particular value chain, thus potentially helping to determine the benefit and income which each actor gains. Relationships or linkages between similar actors can be mapped according to three typologies:

1. Spot market relations
These are relations that are created 'on the spot'. The actors negotiate and conclude their transaction on price, volume and quality on the spot. This is typical for transactions made on a fresh vegetables marketplace: buyer and seller meet, come to an agreement (or not) and as such finalize the transaction.

2. Persistent network relations
When actors have a preference for transacting with each other repeatedly, we can speak of a persistent network relation. This comes with a higher level of trust and some level of interdependence. This relation can be formalized by contracts, but this is not necessary.

3. Vertical integration
This actually goes beyond the definition of a 'relationship', since both actors share the same (legal) ownership. One and the same organization (this can a parent company or a cooperative) deals with different processes throughout the value chain.

Below is an example of aspects (not exhaustive) that can characterize the relationships between actors. These characteristics can be graded or ranked then explained.

Characteristics of the relationship	**Grade (explanation)**	**Fill in the grade**
Frequency	Low, low-medium, medium, high, very high	
Ability to walk away from a contract/switch cost	Yes/low, yes/lower, less, low/higher, no/high	
Duration	Short, short/medium, medium, long, very long	
Power control	High, lower, low, no	
Information shared	Low, low/medium, medium, high, extensive	
Contract enforcement	Legal, legal-complex, complex, bilateral, hierarchy	
Trust	Low, low-medium, medium, high, very high	

An illustration is provided in box 6 below.

Box 6: Relations in the local wheat value chain in Yemen

	Relations with buyers			Relations with suppliers			Relations with thirds		
Value chain actor	Number of years	Pre-finance	Exchange of information	Number of years	Pre-finance	Exchange of information	Financial institutions	Peers	Gov't / NGO support
Farmers	No specific period with buyers, usually they sell to the best offer they get,	Most farmers get cash payments, some farmers get advance payment for the crops	none	Farmers initially buy seeds from seed multiplication institutes to get high-quality seeds and then use their own seeds kept from previous years (after sorting and separating the best seeds).So there is no specific period of relation.	Cash payment	Exposure visits arranged by government to experimental farms on new more productive strains of wheat grown with fertilizers (7 to 13 tons per hectare)	In the past some have relations with agriculture banks	Many farmers are members of agriculture associations that represent them	Supply of Tagagroub wheat seeds in the northern regions; in southern regions support in seed distribution & technical support from agricultural research stations to improve the quality and quantity of wheat
Wholesaler	No specific period with buyers, usually they sell to the best offer they get	Cash and credit	none	None	Usually buys in cash	none	none	none	none
Retailer	10 years in most cases	Cash and (some times credit)	-	10 years in most cases	Cash and credit	Quantity and quality	no	no	no

Source: SMEPS and KIT, 2009

Note: This example captures and combines several aspects of the relationships described above. For instance, the frequency and the duration of the relationship can be analysed through the column on the number of years while power control and contract enforcement can be interpreted from the column on pre-finance. Issues related to information sharing are clearly highlighted in a separate column.

- ***Step 8: Mapping the enabling environment of the value chain***

A potential risk with VCA is that the world surrounding the value chain is not taken into account. Crucial information might be found in the rules and regulations that are governing (parts of) the value chain or in business services that are feeding into the chain. Mapping these services will give an overview of the potential for interventions outside the value chain itself. For instance cultivation training services, management training services, import/export and price data services are part of the business services that can be mapped. Analysing the rules, regulations and policies (trade policies, barriers, subsidies, taxes, price and quality control…) is a critical part of the mapping of the enabling environment.

Annex 1 provides an indicative checklist of questions that can help get some necessary information on actors when it comes to implementing steps 3-8 of the mapping exercise and also useful in estimating costs and margins (section below). The information gathering on intermediaries such as traders, can be more structured through a trader/market survey as detailed by the technical guidance sheet on '*How to conduct a trader survey*' and the *P4P baseline trader survey*[8].

5.3 Tool 3: Estimating costs and margins

This step consists in identifying the costs and marketing margins along a particular chain as outlined in Tool 2 Step 6. This tool focuses on the particulars of the costs involved in doing business for the actor of interest within the market chain. It identifies the labour or money that an actor in the value chain contributes (her/his costs) and the money that an actor in the value chain receives (her/his margins).

Measuring costs and margins enables the analyst to determine the extent to which a value chain is accessible to the poor (e.g. low income farmers). Studying actual costs and margins should be

[8] The trader survey guidance sheet is accessible at: http://www.wfp.org/content/market-analysis-tool-how-conduct-trader-survey. The guideline on the P4P trader survey baseline is accessible at: http://docustore.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp206248.pdf.

considered when an analyst aims to find out whether a given process of a value chain is accessible to a particular participant, and secondly whether a value chain is a good source of income for them. Historic costs and margins, on the other hand, enable the analyst to find out what the financial trends have been in the value chain and whether the chain has potential to grow in the future.

Objectives

Knowledge on costs and margins of actors in a chain enables the analyst to:

- Identify how operational and investment costs are currently distributed amongst actors to judge whether: i) operational costs or investment costs for starting up a business can create barriers to entering a value chain and ii) the weakest actors can increase margins in a value chain, or in other words if their position in the chain can be upgraded by making the chain more efficient (decrease costs) and effective (increase value);
- See how costs and margins in a value chain are changing over time in order to predict growth prospects for the value chain. Some input costs are highly volatile (e.g. petrol costs) -- a sector that might seem to be profitable now may not necessarily be profitable later;
- Compare profit potential of one value chain with that of another to assess whether it may be worthwhile to switch from one chain to another;
- Compare current practices to industry standards or best practices, in order to improve the effectiveness and efficiency of the selected chain (i.e. find out why in area A the same value chain is less profitable than in area B, and draw lessons from it). If there is time, also study success factors of value chains in other sectors; this process is called benchmarking.

From a food security viewpoint, the main goal of studying costs and margins is to increase the margin per product unit for the household (smallholder, or poor farmer). This however is not a guarantee to reduce poverty or food insecurity, because a poor farmer can increase its profit margin per unit, but if he sells fewer products his absolute income may decrease (see TGS on net seller/buyer status)[9]. Therefore analysts should always combine cost and margin analysis with analyzing total revenues or income per actor. This entails gathering more information from household surveys that include comprehensive information on incomes and expenditures (e.g. household expenditure surveys, CFSVAs and P4P baseline surveys).

Key questions

Keeping in mind the gender perspective, the key questions that need to be answered by the analyst in order to achieve this section's objectives are:

- What are each actor's revenues in the value chain? In other words what are each actor's sales volumes and selling prices?
- What are each actor's net profit, margins and break-even point?
- How are investments, costs, revenues, profits and margins divided over the actors in the value chain?
- How are investments, costs, revenues, profits and margins changing over time?
- Are the costs and margins of this value chain lower or higher compared to other product value chains and to similar value chains in other places?
- What are underlying causes of the differences between products and places?

Steps

- ***Step 1: Identifying costs and required investments***

Operational costs can be divided in two types: variable costs and fixed costs.

1) Variable costs are costs of goods sold that change according to the *production volume* (i.e. the marginal unit cost is fixed). In the case of cattle rearing, for instance, expenses such as feed and vaccination will increase proportional to each additional head of cattle. By the same token, a farmer who cultivates two hectare of rice will spend increasingly more on fertilizers for each additional hectare of rice s/he plants. Most variable costs are easy to calculate in this manner, as each unit of production has a given input requirement.

- However, there are some exceptions to be kept in mind, such as **transportation costs**. In this case the flat rate of a service might change the marginal unit cost, which will vary based upon the *volume traded*. A 25 tons truck, for instance, can transport 25 tons of cassava, but also 10

[9] Accessible at http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp214630.pdf

tons and, over short distances, even 40 tons. If the cost of transport is tied to the cost of petrol, going from point A to point B, then it becomes cheaper *per unit* to transport more units (Box 7 offers an example). If real costs are not exactly known the analyst can make assumptions on the average costs.

Box 7
Example of calculating transport costs

Assume that there are 40 m3 of space available in a truck and that it costs $500 to hire the truck. A container of 0.2 m3 holds 8 kg of tomatoes and a container of 0.4 m3 holds 10 kg of green peppers.

Then the transport cost for tomatoes per container and per kilogram is

$500 ÷ (40 m3 ÷ 0.2 m3) = $2.50 per container and $2.50 ÷ 8 kg = $0.3125 per kilogram

While the transport cost for green peppers per container and per kilogram is

$500 ÷ (40 m3 ÷ 0.4 m3) = $5.00 per container and $5.00 ÷ 10 kg = $0.50 per kilogram

Source: DFID (2008)

- **Costs of losses** must be accounted for. Particularly if products are perishable, such as many fresh products, a certain amount of the traded products is usually lost. Box 8 shows how losses should be calculated.

Box 8
Calculating costs on losses

Assume 10 percent loss levels, 1 kg of tomatoes purchased by the trader from the farmer results in 900 grams (0.9 kg.) available for sale to consumers. The trader buys tomatoes from the farmer at $5 per kilogram and marketing costs are $2 per kilogram for the tomatoes originally purchased. The selling price of tomatoes is $8 per kilogram.

Then the costs are

1 kg purchased at $5 per kg = $5.00
1 kg packed and transported at $2 per kg = 2.00

Total Costs = $7.00
Sales Revenue or $8 x 0.9 kg = 7.20
Thus the margin to the trader = $0.20

Below is an example of the more usual and wrong, method of calculation.

1 kg purchased at $5 per kg = $5.00
1 kg packed and transported at $2 per kg = 2.00
10 percent losses or $5 x 0.1 = 0.50

Total Costs = $7.50
Sales Revenue or $8 x 1 kg = 8.00
Thus the margin to the trader = $0.50

The second calculation is wrong because here the trader is seen to be obtaining revenue from produce that has already been "lost".

Source: DFID (2008)

2) *Fixed costs* on the other hand are costs that are independent from the size of production. These costs are typically the expenses paid out regularly that do not go up or down with the sales level. Examples of fixed costs include general office expenses, rent, depreciation, utilities, telephone, property tax, and the like.

Illustration: In case of the increase of farmland (see above), fixed costs are for instance the amortization of material/equipment and the rent paid on land. Although the farmer decides to cultivate 1 more Ha, s/he may not buy additional land as s/he may be a landowner. If s/he had paid off the land already there is no fixed cost on land. S/He may not need additional equipment either as the equipment he owns already maybe underutilized at the moment. In that case there is no fixed cost. But if he continues to pay a rent on land, an amortization or a depreciation (replacement) costs, capital costs (interest on long term loans) they should be counted as fixed costs. In more advanced businesses promotion costs, stationeries and office personnel (not related to the primary production process) are also part of the fixed costs.

As fixed costs do not change proportionally with the production size there is a risk that actors in a value chain do not acknowledge certain costs. They simply forget about these costs. Also certain costs apply to more than 1 product. For instance, the farmer may cultivate different crops (e.g.

cassava, maize, sorghum…) on the same land that is rented. The rent costs should therefore be divided by crop. If not, the costs taken into account by the analysts are too high.

- **Investment costs** are explored through analyzing a value chain actor's required capital for starting up his/her activity. In other words, what an actor need to possess (through buying or renting) in order to run his activity. Finding this out is important in order to judge whether a value chain is accessible for the poor or not. For instance, a high quality cereal value chain may require high quality standards that may not be accessible to a small farmer. Hence, cleaning, grading and drying equipment may be required for entering the market for this cereal.

  To have a complete picture of investment costs, it is also important to calculate depreciation costs, i.e. the money set aside to be able to pay for the replacement of capital goods (machines and equipment). However as depreciation costs are not expenses they decrease income but not cash money. In general, poor farmers usually do not calculate depreciation costs. They need all their income to survive.

Not all costs are easy to be categorized into fixed or variable costs and there is not always a right or wrong approach. Regardless of which choice is made, it is worth trying to be consistent throughout the analysis.

- ***Step 2: Calculating revenues per actor[10]***

Revenues are calculated by multiplying the volume sold (Q) with the selling price (P) and, subsequently, by adding additional sources of income directly related to production of the analysed good, such as revenues of selling the production waste of a product. The latter for instance happens in the bamboo sector where leftovers are used for producing paper pulp or fuel.

*Revenues = (Q * P) + other sources of income*

Price variations: Prices differ per marketing channel or per market segment and sometimes per grade or per quantity sold. Also prices sometimes change over the season. Prices can even vary during one single day, like in many fresh vegetables markets. Therefore questionnaires should include questions related to what the prices in different markets, for different products and during the different seasons are. Weighted average prices are recommended as they account for the actual quantities sold. An example of how to do this is provided in Box 9.

Box 9
An example of calculating the weighted average selling price

Assume an example involving a consignment of 100 kg of tomatoes as follows

50 kg sold at $2.00 = $100
20 kg sold at $1.40 = 28
20 kg sold at $1.00 = 20
5 kg sold at $0.40 = 2
(5 kg which cannot be sold)

Total Revenue = $150

The average selling price per kilogram is ($2.00 + $1.40 + $1.00 + $0.40 + $0.00)/4 = $0.96, while the weighted average selling price is $150 ÷ 100 kg = $1.50

Source: DFID (2008)

Measurement problems: When studying a market over a longer period of time, - for example over a 10-year period - it is necessary to incorporate inflation rates. A base year against which all prices are adapted needs to be chosen. If this is too complicated a researcher should at least mention that there has been inflation or deflation in order to make a reader aware of the situation. During interviews it can happen that many different cost and price units are used. For instance, handicrafts producers sometimes refer to their production volume in pieces, sometimes in tons and sometimes in containers. This can be particularly confusing when more than one analyst conducts the study. It is therefore important to standardize measurements and provide clearly defined conversions.

[10] See technical guidance sheet on *Net seller/buyer status* for more details. Accessible at http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp214630.pdf

- ***Step 3: Analyzing the financial position of the value chain actors***

The financial position of each value chain actor can be analyzed using several ratios:

The **net income** or **profit margin** or **gross margin** is calculated by deducting total costs (both variable and fixed costs) from revenues. It's the money left over after all the expenses of the company have been subtracted from revenues. It reflects the profitability of an activity (e.g. investment in farming, livestock rearing, etc.).

Net income = revenues – variable costs – fixed costs

Example: For a cattle raiser who sells 100 cows (Q) for 100,000 FCFA (P) per cow, revenues would be: 100,000 (P)* 100 (Q) = 10,000,000 FCFA. With total costs for seeds, vaccines, labour, rent, depreciation and tax estimated at 2,000,000 FCFA, his net income would be 8,000,000 FCFA, indicating that raising cattle is profitable.

Measuring labour cost can be challenging as households rarely keep record of the time spent on a specific activity. As shown in box 10, labour is generally used for land preparation, transplanting, and weeding, using fertilizer, insecticide spraying, harvesting, threshing, transporting and other purposes. Assuming daily (un/skilled) wage rate is known and labour is used for a single crop in a day, six working hours per day can be considered as equivalent to a man-day be it a family labour or hired labour. In order to estimate the labour cost it is important to ask the farmer to list all the tasks undertaken by manpower, the number of individuals involved and the amount of time (in days or hours) taken for each task.

The **net margin** on a product is the net income or gross margin per product. This is calculated by dividing the net income by the total number of products sold (Q). While the net income may look high, the net income per unit (i.e. the net margin) can be low, hence influencing the perception of the profitability when compared to competitors. It is therefore a measure of competitiveness.

Net margin = Net income / Q

Example: In the case of the cattle raiser, the net margin per cow would be 8,000,000 FCFA net income / 100 cows = 80,000 FCFA per cow. For example, in the case of P4P, one could compare this figure with the competitors in other areas and advice on where the value for money is higher for the beneficiaries (i.e. the smallholders).

It is important to note that the reality may be more complex than the previous simplified example for there may be other costs. An example of a rice farmer's costs, revenues and margins is presented in Box 10.

Box 10
An Example of Costs, revenues and margins of rice farming

Input			Unit	Farmer Practice		
				Quantity	Unit Price	Amount
Variable costs	Seed (a)		Kg	200	2,000	400,000
	Fertilizer (b)	Urea	Kg	150	2,200	330,000
		DAP	Kg	100	3,000	300,000
		Phosphorous	Kg	50	2,300	115,000
	Insecticide (c)		FCFA	1	350,000	335,000
	Fuel (d)	Diesel	Liter	60	5,500	330,000
		Lubricant	Liter	3	10,000	30,000
	Irrigation (e)		FCFA	1	50,000	50,000
	Soil work (f)		FCFA	1	320,000	320,000
	Threshing (g)		FCFA	1	320,000	320,000
	Other facilities (h)		FCFA	1	160,000	160,000
	Labour (i)	Cleaning field	Person	10	20,000	200,000
		Sowing	Person	5	20,000	100,000
		Weeding	Person	30	20,000	600,000
		Fertilizing	Person	6	20,000	120,000
		Spraying insecticide	Person	6	20,000	120,000
		Pumping water	Person	13	20,000	260,000
	Harvesting (j)	Cutting	Person	18	20,000	360,000
		Transporting	Person	8	20,000	160,000
		Drying	Person	8	20,000	160,000
	Other labour (k)		Person	12	20,000	240,000
Fixed Costs	Credit (l)	1% @ 4 months	FCFA	4	50,250	201,000
Total costs (m)		Material (r)	FCFA			2,705,000
		Labour (s)	FCFA			2,320,000
		Total (t)= (l)+(r)+(s)	FCFA			5,226,000
Yield (n)		= Revenues (n)	Kg	3,900	1,350	5,265,000
Cost per unit (o)		= Total (t)/Quantity	FCFA/Kg			1,340
Net income or Profit margin (p)		= Revenues (n)-Cost (t)	FCFA/Kg			39,000
% Profit margin(q)		=100*(p)/(n)	%			0,74%
Net margin(u)		=(p)/Quantity	FCFA/Kg			10

Source: Adapted from DFID (2008)

The **break-even point** shows how much an actor has to sell before he starts making profit. In other words the point at which his revenues start exceeding his costs.

Break even point = Fixed costs / (P-Variable Costs) = the number of units

Example: If the total fixed costs of the cows raiser are 1,000,000 FCFA, one cow is sold for 100,000 FCFA (P) and variable costs per cow are 10,000 FCFA, the cattle raiser has to sell 11 cows in order to break even: 1,000,000 / (100,000-10,000) = 11.1

Despite its limitations, break-even analysis is a very useful tool to approach a variety of decision problems. Such questions as the costs of expansion, evaluation of sales or profit performance, estimation of the impact of various expenses on profit, setting prices, and financial analysis in general are appropriately addressed using break-even analysis. In the example above, the cow raiser would wonder if selling 11 cows before making a profit is worth the investment and the time it will take.

- ***Step 4. Taking the time dimension into consideration***

The above aspects should be considered over time. What may look like a valuable value chain today may be invaluable next year. **The analyst should therefore study the market performance (e.g. trends of farm gate prices, wholesale prices, retail prices, price integration, production, imports, exports, seasonality…) through secondary data analysis** and consider the implications of these trends for the future[11]. For example, smallholders or small traders who trade on a small scale have small margins on the products they sell. With the increased cost of fuel in 2008, the margins of small-scale actors may have decreased like any other actor of the chain. But as they are likely to be the poorest of the chain with limited coping capacities, the future would not look bright for

[11] For further details see technical guidance on the basics of market analysis for food security. Accessible at: http://www.wfp.org/content/technical-guidance-sheet-basics-market-analysis-food-security

them, with 2008 as a reference year. They would be better off increasing the scale of their business or finding another source of income. Using an average year (e.g. 5-year average prior to 2008) or the real price of 2008 (i.e. the nominal price deflated by inflation) as a reference would provide a different outlook.

Changes can also derive from the commodity market. For instance, when people earn higher incomes, the demand for and hence revenues from commodity products, such as rice and maize, increase for poor households, though the share of these commodities on incomes will decrease at a certain point. When the increased demand translates into a price increase, many farmers start growing these products or already existing farmers intensify their production.

However, it is worth noting that the increased demand does not necessarily trickle down to producers through an increase of farm gate prices. This is due to the fact that households (especially the richer ones) tend to diversify their consumption as their incomes increase. It is therefore, important to understand the consumption behaviours, including the relationships between complementary and substitute goods during the VCA. It is also worth noting that the demand for a specific food commodity only grows (as a result of the income increase) up to the point that people have sufficient food, as people can only eat a certain amount of rice and maize. After that point, when supply exceeds demand, prices and hence revenues go down, and farmers may need to diversify their production. Furthermore, the supply and demand adjustment behaviour does not apply strictly to staple food commodities. In general, poor households tend to maintain their demand for staple food unchanged regardless of price and income changes. All these caveats call for considering the consumption dynamics in relation to the context in which the VCA is carried out, especially for staple foods.

- ***Step 5. Relative financial position of actors in the value chain***

To finalize the understanding of the financial position of an actor compared to other actors in a chain, the division of investments, costs, revenues, net income (or profit) and margins among the actors in a chain are considered. There are several ways to present the financial position of actors in a value chain, for instance in table (see box 11) or through a diagram.

Box 11
Prices, margins and value shares in the local wheat value chain in Marketland

ep number	Value chain actor	Total costs or Purchase price (YR/50kg) -A-	Total revenues or Selling price (YR/50kg) -B-	Net income or gross margin (YR/50kg) C=B-A	Gross margin (%) D=C/B	Domestic value share (%) E=B/R	Added value export (%) F=B/X
1	Farmer	1,000	6,687	5,687	85%	65%	84%
2	Wholesaler	6,687	7,250	563	8%	5%	
3	Retailer	7,250	R=10,333	3,083	30%	30%	
4	Exporter	6,687	X=8,000	1,313	16%		16%

In the local-wheat value chain in Marketland, most value share goes to the farmer, between 65% and 84%, depending on the market destination. It is evident that the farmer shares relatively low costs and has high profit margin. Wholesalers appropriate only 5% of the consumer value, but this triples in the case of export (16%). Domestic retailers of the local wheat seem to make sound operating margins. Overall, the financial position of actors indicates that costs and margins are shared unequally in the value chain and could be an intervention point for a project. In this example, the focus could be on wholesalers by scaling up their business in the chain in order to make wholesale trade more attractive. There is a risk of trade collapse which can undermine farmers' access to markets.

Source: Adapted from SMEPS and KIT, 2009. The actual figures from Yemen were adapted for an illustration purpose.

Instead of cost per unit, presenting the total costs, revenues and profits per actor per year shows the scale of an actor's business. This is important as in some cases when considering the profit per unit, it may look like an actor doesn't have a fair share as it only makes little profit per unit, while

when considering this actor's total profit per year it turns out that the actor actually earns a decent income. Commodities have low profit margins per unit, but as they are sold in large quantities the total profit per year is still financially attractive.

- ***Step 6. Calculating opportunity costs***

Before people decide to enter a new market or a new business they first need to figure out which business is the most profitable for them. This estimates the opportunity cost, i.e. the profit (or utility) that is forgone by engaging in another activity. This is particularly important for poor people who have limited resources and hence cannot afford to choose the wrong market or sector. Revenues, costs and margins of value chains should therefore be compared (both among different marketing channels and different product chains), but also the potential for scaling up and the required investments should be investigated.

- ***Step 7: Benchmarking***

Comparing similar value chains in different regions will provide information on the potential for efficiency gains. For instance, maize farmers in Northern Marketland spend 1 million FCFA on inputs per Ha, while their counterparts in the central highlands of Marketland only spend 500,000 FCFA. This could mean that prices for inputs are different (an opportunity for market entrants) or that farmers use too many inputs. Maybe they can learn from each other's production techniques! Again, make sure that all units are the same and the enabling environment is taken into account before making comparisons!

- ***Step 8: Giving meaning to the quantitative data***

The final step in the costs and margins section is to try to go beyond the quantitative data and explore why certain actors in the chain have higher margins and lower costs than others. Is this, for instance, only caused by the fact that one actor invests more in a chain than another? Or, can it be explained by the governance of a chain or whether power is unequally distributed among actors (e.g. gender inequalities)? An additional reason could be that one actor has better access to market information because it has better linkages to the market than another actor. In any case always try to think outside the box and never take things for granted!

5.4 Tool 4: Analysing technology, knowledge and upgrading

The term technology hereto refers to all types of technology ranging from so-called traditional technology (often self developed by the users based on experiences) to high technology (developed through extensive R&D) without making a judgement on the value of this technology. In a pro-poor technology analysis special attention should be paid to the existing levels of traditional technology and its effectiveness.

In analyzing technology and knowledge in the value chain, the basic assumption is that the quality produced should meet the preferences or specifications of demand. Such a correspondence determines which technology should be used and what knowledge levels are required.

Objectives

The objectives of this tool are to:

- Analyse the efficiency & effectiveness of technology in use within the value chain
- Undertake a typology of current & required technology in the value chain
- Analyse the appropriateness of technology (affordability, suitability, accessibility, replicability and fungibility[12]) matched with skills of technology at different levels of the value chain
- Analyse upgrading options within the value chain that provide the required quality of output
- Analyse the impact of external investments in knowledge and technology (innovation and R&D)

Key Questions

[12] A technology is fungible when it is substitutable, interchangeable, exchangeable or replaceable, in whole or in part, for another technology of the same nature or specifications.

- What are the characteristics of the current technology in use in the value chain (per processes, actors, poor and non-poor)?
- What indigenous and/or other knowledge is being used in the value chain?
- Does the knowledge and technology produce the desired output?
- What are the costs and margins of the technology (refer also to tool 3)?
- Who determines orientation and investment in knowledge and technology in the value chain?
- What upgrading options are available?
- Does investment in upgrading pay off? Does it bring enough to value-added to the providers and/or the beneficiaries?
- Who has access to knowledge (e.g. women vs. men, poor vs. non-poor, skilled vs. unskilled, smallholder vs. large farmers) and who provides knowledge (e.g. the role of extension services, private sector, research centres, academics…)?

Important aspects in the upgrading of technology and knowledge will be the impact on the weakest actors of the chain in terms of:

- **Producers**: Will the upgraded technology and knowledge be accessible to smallholders, women, etc.? Can they afford it? Can it be readily utilized? What level of risk is involved?
- **Labourers**: Will the upgraded technology be labour-intensive so more people, in particular poor and/or women can be absorbed through increased employment opportunities?
- **Consumers**: Will the upgrading of technology and knowledge in the value chain lead to increased access for the weakest actors to products at a more affordable price? Will production inputs needed for the upgrading (often seeds and breeds) be available to the weakest actors so they can also benefit from the technology upgrading?

Steps

- ***Step 1. Map the variation / differences in knowledge and technology of the separate processes in the value chain.***

In this first step the different uses and users of the current technologies in the value chain will be analysed. For each process in the value chain the levels of knowledge and technology being used is mapped for the different users, disaggregating between poor and non-poor users.

For each process that is identified in the mapping exercise, a matrix should be made that shows the position of the process in terms of poor and non-poor users. The table below gives an example of the type of matrix that could be constructed.

Table 4 Example of knowledge and technology matrix: Cassava production and processing

	Production				**Processing**	
	Knowledge	**Technology**			**Knowledge**	**Technology**
Poor	Indigenous knowledge on upland growing conditions	Local varieties		**Poor**	Indigenous knowledge on chip making and drying	Open air drying and home storage in bags
Non-Poor	Upgraded knowledge from extension training	Hybrid varieties from China		**Non-Poor**	Knowledge from formal studies	High tech starch processing

Source: DFID (2008)

In order to determine the types of knowledge and technologies utilised by actors at different levels of the value chain, it is important to observe the types of technology, and to ask questions to actors that are designed to gather useful information about knowledge levels and the appropriateness of technology being utilized. The table below gives some examples of questions that could be asked to value chain actors (women and men), and the types of information that could be determined from asking those questions.

Table 5 Examples of questions that can be asked to the different actors in the value chain

Question	**Details to look for**
What is the technology you are using to produce your output?	Get a clear description of the technology that is used. Primary production: ▪ Varieties in use ▪ Inputs ▪ Tools / machinery ▪ Post harvest treatment / storage ▪ Processing: Home based drying Small scale factory

	Large enterprises ▪ Transport: Foot / horseback Motorbikes / bicycles Cars / trucks ▪ Packaging / labelling ▪ Bulk (more than 10 kg) ▪ Bags ▪ Packs ▪ Etc
Where did you learn about this technology?	Is the knowledge on the technology passed ▪ From generation to generation ▪ From other people in the neighbourhood ▪ By extension (or other) services ▪ Through the media (radio / TV) ▪ Through formal education (yourself or family members)
Since when have you been using this technology?	Date that the technology was first introduced and the modifications that have taken place
Who has paid for the initial cost of the technology	▪ Paid by the user ▪ Introduced with outside subsidy (for instance an extension model ▪ Introduced as part of a business deal (free training with a seed purchase)
What investments (capital, labour, land etc) have you made in the technology and knowledge?	Capital Investments: ▪ Initial amounts ▪ Maintenance / modifications ▪ Cost to operate the technology ▪ Labour (skilled, unskilled, male, female…) ▪ Amount of time needed to operate the technology ▪ Land ▪ Amount of space required for the technology
For what purpose can the technology be used?	Can the technology be used for other purposes? Example: Cassava can be used to feed the own animals or sell to the starch factory.

Source: DFID (2008)

- ***Step 2 Identify distinct market chains based on knowledge and technology***

For each market channel that is identified in the mapping exercise, a matrix should be made that shows the position of the process in terms of status (poor vs. non-poor, smallholder vs. large farmer, women vs. men, skilled vs. unskilled) users, type of technology used and type of output. It is important to analyse not only which technology is used in each market channel, but to also analyse from the consumer-end towards the producers to understand customer demand and how it translates to the use of appropriate technology (e.g. tastes and preferences of consumers).

During the analysis, it will be good to support your investigations with photo materials, especially to demonstrate and show different technologies that are being used by each actor.

- ***Step 3 Identify and quantify gaps in knowledge & technology that hinder upgrading between market chains***

In the third step of the analysis the possible upgrading solutions and reasons why they are not being applied are analysed. In other words, this step looks at what the limitations of these options are, especially for the weakest actors of the chain and the implications for them to be competitive and access markets.

Box 12
Concepts of Upgrading

- **Process upgrading**. Process upgrading refers to the efficiency of production. Can costs be reduced? Can speed of delivery be increased? For instance can a farmer reduce the use of fertilisers while maintaining the same production levels? Or can a transporter use stronger boxes to reduce losses?
- **Product upgrading**: Product upgrading refers to the introduction of new products or improving old products. For instance can a processor use a better drying oven to produce higher quality dried cassava?
- **Functional upgrading**: Functional upgrading refers to the identification of which activities the actor in the chain should concentrate on. Should a farmer be producer, processor and transporter altogether, or concentrate on just one or two steps and maximize efficiency? Can outsourcing of other activities improve added value? For instance can a group of small farmers bring maize bags together to the market in one small truck?

Source: DFID (2008)

In the search for upgrading possibilities it is important to look not only at one actor but also at the effect of the upgrading in the whole chain. The introduction of a new variety for the producer can

mean that the processor also has to change technology or that different requirement has to be placed on transport.

Construct a matrix as shown in the table below, and for each level of the value chain, identify potential product, process and functional upgrading possibilities. It may not be possible to identify all three types of upgrading strategy for each level of the chain. In the case that no possibility can be identified, leave that cell blank.

	Producer		Processor		Trader		Wholesaler		Retailer	
Upgrading	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
Product										
Process										
Functional										

Note: The subtitles of the columns can be replaced by 'poor/non-poor', skilled/unskilled…

- ***Step 4 Analyse which options are within reach of the weakest actors (in terms of knowledge level, investment, use etc)***

The fourth step examines which of the upgrading options are within reach of the weakest actors. There are many aspects to consider when deciding if an upgrading option is within reach of the weakest actors. These should be considered when making an analysis of these options.

Some of the important aspects to consider in this step of the analysis are summarized in the table below.

Table 6: Important aspects to look at when selecting the best potential upgrading options for the poor

Issue	**Details to look for**
Capacity to react to changes in demand	Consumer demand is often changing. The success of a value chain is mostly determined by the capacity to react as quickly as possible to these changes. Upgraded technology should ideally have the capacity to deal with this without making a lot of extra changes or investments.
Bottleneck analysis to determine at what level to invest	In order to improve the performance of the whole value chain it is important to analyse at what level in the chain the upgrading should be done in terms of efficiency and effectiveness. When at more than one place in the value chain upgrading should take place, it is important to look where it will have the best impact on the poor.
Prioritise options	Based on the bottleneck analysis a prioritisation should be made at what level in the chain the first interventions should take place to upgrade the whole chain but also in terms of direct impact on the poor.
Incentives that stimulate investments in knowledge technology / lack of incentives and barriers that limit the poor from upgrading	In contexts of poverty there is often a lack of technology and knowledge development and subsequently a lack of upgrading in the value chain. It is important to analyse what the incentives or lack of incentives for investment are: ▪ Why do people invest in new technology? Or ▪ Why do people not invest in new technology? ▪ Why do people gather new knowledge? Or ▪ Why do people not look for new knowledge? ▪ Are there factors that hinder the poor from investing in technology of knowledge?
Role of local institutes / organisations in R&D and innovation	An often seen, limitation to technology upgrading is the "distance of the researchers to the local situation." Technologies developed in location A do not suit to the circumstances in location B. In the analysis it is necessary to look at: ▪ What local institutions / organisations are involved in R&D and innovation? ▪ What have been their past contributions to technology development? ▪ Can they play a role in the current value chain upgrading?
Policy environment for pro-poor technology development	What are the policies for technology development and value chain upgrading in place? (R&D, dissemination, credit & investment) Do these policies favour pro-poor technology development? Are people aware of these policies?
Information flows	Trickle down of R&D information & bottom up flows of indigenous knowledge
Dissemination	Low-tech feasible technology can disseminate itself based on reputation and often do not need expensive promotion campaigns

Innovations in knowledge and technology often come from outside service providers (public or private). In many agricultural value chains, the lack of these service providers often forms a large bottleneck to the possibility to upgrade a value chain. While the presence of these service providers (extension, vocational training, knowledge providers, etc.) must be considered, it is also necessary to analyse whether the poor have an equal access to the services that can improve their knowledge and technology, and if the service offers are suitable to the capacity level of the poor.

Conclusion: Guiding principles but no fixed rules

In summary, there are no fixed rules as to how the VCA should be carried out. The four tools presented in this TGS are the backbone of a VCA. They can be undertaken independently. However, in general, the VCA starts with the identification and mapping of the VC of interest. Depending on the goals and scope of the analysis needed, various other qualitative and quantitative tools exist in the literature that can be combined with the ones presented in this TGS.

A comprehensive VCA that maps the chain actors and takes into account the enabling environment is likely to provide useful lessons for decision-making. At the end of the day, a VC will make sure answers are provided to the following core questions:

- How are existing chains structured and how do they operate?
- How is value shared among actors and what are the implications for each actor's performance in the chain?
- How does the business environment contribute to the performance of the value chain?
- What are the leverage points in the chain that would maintain or enhance the performance of the value chain?

Assuming the tools presented in this TGS are mobilized, a VCA report will most probably provide some insights into the following aspects:

- A map of the chain actors and product flow
- The profile of key chain actors and chain relations
- An analysis of constraints and opportunities as viewed by the chain actors
- The identification of financial flows, information flows, quality management, and chain service providers, with an analysis of possible gaps/constraints
- Constraints in the regulatory environment and physical infrastructure
- The cost/price formation and value-adding along the chain: fixed and variable costs, revenues, net income, net margin, added value, value shares
- The market performance of the chain: evolution in production, imports, exports, prices, (unmet) market opportunities
- Some strategies and possible constraints for chain upgrading (products, processes, functions).

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Annex 1: Indicative checklist per chain actor

Farmers (both women and men)

- Do you own or rent land?
- What kind of crop (millet, cowpea, sorghum and maize) do you produce and sell?
- How many kilograms of the above mentioned crops do you manage to sell weekly/monthly? (Data to be gathered per single crop); when do you sell the product?
- Any seasonal/monthly variation in sales of the above mentioned crops?
- How many hectares you devote to millet, cowpea, sorghum or maize farming? (Data to be gathered per single crop).
- What is your yield per single crop in dry and rainy season?
- How much does it cost you to farm daily in dry and rainy season? (Production costs: (i) Seeds; (ii) Land preparation (Man/day); (iii) Weeding; (iv) Harvesting, and; (v) Threshing); what are your post-harvest/storage costs and losses?
- What equipment/materials did you acquired in order to produce these crops? How much did they cost you?
- How much of labour did you required in order to produce these crops (number of workers, skills, work hours, wages by sex…)?
- Where and to whom do you sell your crops?
- What is the unit price of your crops?
- Do you have market information on price details per crop?
- Did the price at which you sold these commodities change in the past 5 years?
- Have you noticed any increase in crops sales?
- What are the difficulties you are facing as smallholder and your strengths?
- Would you like to produce and sell more? What you think could help you produce more, at a better quality and lower cost (SWOT)?

Intermediaries (both women and men)

- Which crops do you buy and from whom do you buy them (farmers, collectors, assemblers… by sex)?
- How do you transport the commodities?
- How much you pay for the fuel necessary to transport these commodities?
- How many kilograms/tons/bags of crops do you buy in dry and rainy season?
- How much do you pay per kg per crop in dry and rainy season?
- Which is the form of payment, credit or cash?
- Who buys the crops from you (e.g. retailers, wholesalers by sex)?
- How much do you sell the commodity per kg in dry and rainy season?
- Do you sell daily/weekly/monthly all the amount of crops you bought?
- Did you sell these commodities at the same price throughout the past 5 years? Over the next year is there room for business increase of crops?
- Have you noticed any increase in crops sales?
- What are the difficulties you are facing as intermediary and your strong points?
- What you think would help poor farmers produce more and at a better quality?

Processors (e.g. sunflower) (both women and men)

- How long have you been processing sunflower seeds for edible oil making?
- Is sunflower oil production your main source of income/primary activity?
- How many are the family components (women, men, children…) helping you in processing activities?
- From whom do you buy the seeds (including by sex)?
- What is the quality of the seeds you buy? Do you make any sort of quality control?
- Where do you store it?
- How many kilograms do you buy daily on average in the dry season? How many in the rainy season?
- How much do you pay the sunflower seeds per kg in the dry season? How much in the rainy season?
- What is the form of payment?
- How much does it cost for you to process sunflower seeds for oil making in the dry season? How much in the rainy season?
- Can you please show me where do you process the seeds?
- What type of sunflower oil do you produce?
- How much do you sell sunflower oil per liter in the dry season? How much in the rainy season? Did you sell the oil always at the same price in the past five years? If not, how much you sold it 5/4/3/2/1 years ago? How many liters of sunflower oil you sold yearly 5/4/3/2/1 years ago? (Trends in supply of sunflower oil)
- By who is the sunflower oil bought (including by sex)? What is your major problem in your processing business?
- What are the difficulties you are facing as processor and your strong points?
- How do you measure the sunflower seeds quality?
- What is the maximum price you are willing to pay to get higher quality and larger quantity of sunflower seeds?
- What type of arrangement would you have with your business counterpart?
- Is your business expanding or decreasing? Has it expanded or decreased over the last five years? Have you invested in new machineries? Have you hired new people?
- Over the next five years, is there room for business increase?

(Open Market) Retailers (both women and men)

- Which crops do you buy and from whom do you buy them (farmers, collectors, wholesalers…by sex)?
- How many kilograms of crops you buy daily in dry and rainy season?
- How much do you pay per kg per crop in dry and rainy season?
- Which is the form of payment, credit or cash?
- By who is the crop bought (including by sex)?
- How much do you sell the commodity per kg in dry and rainy season?
- Did you sell these commodities at the same price throughout the past 5 years? How many kg did you sell 5/4/3/2/1 years ago? (Trends in supply of crops)
- Have you noticed any increase in crops sales? Over the next 5 years is there room for business increase of crops?
- Do you sell daily all the amount of crops you bought?
- What are the difficulties you are facing as intermediary and your strong points? (SWOT)
- What you think would help poor farmers produce more and at a better quality and lower costs?

Consumers (both women and men)

- What type of crops you prefer/consume more?
- How many kilograms of crops you buy daily in dry and rainy season?
- At what price you buy them (per kg per crop) in dry and rainy season?

- Did you buy the commodities always at the same price the past 5 years? If not how much you paid 5/4/3/2/1 years ago? How many kg you bought daily/weekly 5/4/3/2/1 years ago? (Trends in demand of crops)
- From whom/where you buy the crops?
- How do you find the quality of crops you usually purchase?
- What is high/low quality of crops, according to you?
- Would you like to pay a higher price for better quality (more hygienic, tastier, fresher, better packaged/labelled etc.) crops? What is the maximal price you would pay per crop per kg?
- What do you think could incentive you to buy more crops? Lower cost or better quality?
- Do you think Farmers Associations could be a winning strategy to achieve the above mentioned conditions? (SWOT)

Supporting services (e.g. Government Officials)

- What is the crops production peak?
- Do you import crops? If so, have you developed any strategy to substitute import and develop the national economy?
- Do you subsidize the production?
- Who decides the price throughout the year? The market or is it administratively decided, depending on the season?
- What are the coping strategies against pitfall of production during dry season?
- Do you provide any kind of support to poor farmers? And to Farmers Associations (FAs)?
- Are (FAs) registered or accredited anyhow?
- What is the local government's engagement vis-à-vis the improvement of farming and quality? And vis-à-vis poor farmers?
- Have you so far developed any support strategy to ease crops market chain (production/collection/processing/retailing)? At which stage of the chain do you specifically intervene?
- Do you see any role for FAs in supporting farming?
- Where do you see strengths and weaknesses of the market chain?
- Which policies do you think would help poor farmers produce more, at a better quality/hygiene/better packaging and labelling and lower cost?

Technology (disaggregated by women and men)

- What kind of equipment/material and techniques do you use? For how long have you been using them?
- Why do you invest in these equipment, materials and techniques?
- Who decides on the choice of the equipment, materials and techniques to be used?
- Can the equipment and materials be repaired or reproduced in the community or by you?
- Are you pleased with the results you get by using the equipment and materials?
- Are you pleased with the results you get by applying the techniques?
- What costs do you incur in acquiring and applying the techniques
- What improvement would you suggest?
- Are the costs involved in the improvements incurred by you? Do they add enough value worth the costs incurred?
- Who provides you with the knowledge you need in order to do your work? Do you have easy access to that knowledge?