

Seed Value Chain Analysis



WHAT is value chain analysis?

A value chain is a chain of activities that are undertaken in the production, processing, marketing and sales of a product of any kind; it is the process in which raw materials are transformed into a finished product that is sold and consumed. The term value chain reflects that value is added at each point in the chain.

Three different levels can be distinguished in a value chain. The first level of activities are handled by value chain operators, which are the owners of the product at some stage in the chain. Operators include producers, collectors, processors, wholesalers, retailers and consumers. The second level consists of service providers, which assist the operators in performing their tasks. Support functions include input supply, financial services, quality assurance, extension and research. The third level is the enabling environment that refers to the environment in which operators and service providers do business. Market related infrastructure, policies, regulations and business agreements are part of the enabling environment. Box 1 shares the terminology used in value chain analysis.

Box 1: Terminology used in value chain analysis

Operators: actually own the product at some stage in the chain. They are usually the producers, processors, traders, wholesalers, retailers and consumers

Service providers: support the operators in their activities with knowledge, inputs, finance, certification, research and extension

Enabling environment: relates to context in which operators and service providers perform their functions, and include governance, legislative and regulative frameworks and economic environment

Value chain analysis refers to the appraisal of the functioning of the chain, and maps all stakeholders involved and their interactions. Flows of the product, services, financial resources and knowledge are analysed, to explore whether linkages between stakeholders are effective and efficient in terms of the performance of the entire value chain. These include linkages among operators, but also between operators and service providers. The analysis provides insights in the strengths of the linkages, and identifies bottlenecks and entry points for interventions to increase value chain performance. It also provides insights in institutional barriers relating to policies and regulations.

WHAT is seed value chain analysis?

A seed value chain covers the process of activities from the use of plant genetic resources to the marketing or distribution of seed of a specific variety and a certain type of quality to farmers. Seed value chain analysis identifies the operators and service providers and their activities in the seed chain. Box 2 explains the basic activities of the operators; they include plant genetic resources management, variety development, early generation seed production, seed multiplication, and seed marketing and dissemination. Even though many variations in composition and structure of value chains exist among dissimilar seed systems, the chain of operational activities is generally the same, and within a seed system even independent from the crop reproduction system.

Box 2: Activities of operators in seed value chains

- **Plant genetic resources management:** the genetic resources base maintained as basis for variety development
- **Variety development:** the process of breeding and selection of new varieties, including the testing of varieties within different agro-ecologies for different user groups
- **Early generation seed production:** the maintenance of breeders' seed, and the production and dissemination of pre-basic and basic seed
- **Seed multiplication:** the multiplication of early generation seed into the certified, quality declared, or other quality classes of seed, to be used for crop production
- **Seed marketing and dissemination:** the collection, distribution and sales of seed

The operational activities may be in the hands of one stakeholder, which is the case with global seed companies like Monsanto or Syngenta; or may be implemented by separate organizations. An example of the latter is the mixed seed system in Mali with public genetic resources and breeding programmes, community based seed production schemes, and commercial agro-dealers (see technical notes issue no 2). The analysis of linkages between value chain operators allows for a better understanding of the functioning of the seed chain. See in figure 1 the maize seed value chain and its operators in the system of public seed enterprises in Ethiopia.

For each component in the chain different services are provided by a variety of stakeholders; see examples of services elaborated in box 3. One stakeholder may provide different services to different components in the seed value chain. For example, in the community-based seed system, the extension service may support farmers in the management of their genetic resources, but may also support them in the marketing of seed to neighbouring communities. The identification and analysis of services provided to the different operators allows for a better understanding of the performance of the seed chain. See and example in figure 1.

Box 3: Types of services provided within seed value chains

- **Rural seed extension:** promoting variety management and seed quality at farmer's and community levels; strengthening of informal seed systems through community seed banks, seed fairs, organization of farmers in community-based seed production schemes, etc.
- **Variety testing and release:** identification of varieties matching specific agro-ecologies and demands of farmers; and subsequent release of these varieties for seed production
- **Plant variety protection:** implementation of incentive structure promoting the investment in plant breeding and rewarding those investors with intellectual property rights
- **Quality assurance in seed production:** different quality assurance mechanisms, varying from seed in informal systems (seed of confidence), to quality declared and certified seed, and accreditation of seed producers and companies
- **Quality assurance in seed commercialization:** quality management mechanisms ensuring that the commercialization of seed and varieties follows agreed standards in terms of quantity, quality, price and time
- **Business management services:** development of business plans for entrepreneurs, and support in associated investments
- **Financial services and management:** specific financial products for financing seed production (basic seed and input purchase) and seed marketing (promotion); facilitating investment through loans for the purchase of processing equipment, transport and storage facilities
- **Marketing information and promotion:** rural extension promoting the use of quality seed and providing vital marketing information back to operators in the seed value chain (plant breeders, early generation and quality seed producers, agro-dealers)

Linkages between operators on the one hand, and between operators and service providers at the other hand, are guided by the enabling environment, in the seed value chain related to seed related policies, regulations and guidelines, but also government land policies, credit conditions, etc. Interactions between the three levels in the seed value chain are driven by incentives. Analysing incentives that motivate collaboration in the seed chain is helpful in defining strategies for enhancing value chain efficiency. In this regard incentives promoting entrepreneurship are powerful.

WHY design a specific tool for value chain analysis within seed systems?

In the context of the technical notes addressing seed sector development, we have transformed tools for value chain analysis into an analytical tool that addresses seed value chains within specific seed systems, realizing that seed value chains are largely different between seed systems, and analysis cannot be done in a generalized manner for seed in the entire sector.

As an example, in Mali, the seed value chain for sorghum in the farmer saved seed system, the chain for open pollinated varieties of maize in the community-based seed system, and cotton in the closed value chain seed system (as elaborated in technical notes issue no 2) are largely different. These three systems have their own operators and service providers, and also vary in the enabling environment. The before mentioned sorghum and cotton seed value chains are worlds apart.

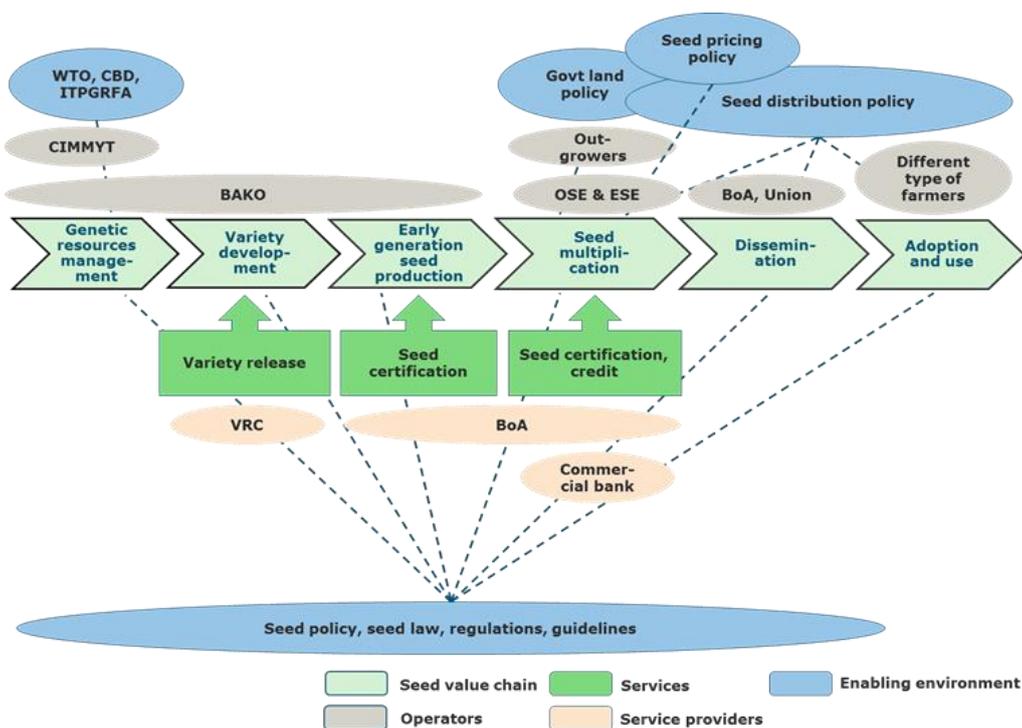


Figure 1. Seed value chain of maize in the public seed enterprises system in Ethiopia

Value chain operators: CIMMYT: International Maize and Wheat Improvement Centre; Bako Agricultural Research Institute; ESE: Ethiopian Seed Enterprise; OSE: Oromia Seed Enterprise; Outgrowers of public seed enterprises; BoA: Bureau of Agriculture; Farmer Unions; different types of farmers

Service providers: VCR: Variety Release Committee; BoA: Bureau of Agriculture; Commercial banks

Enabling environment: WTO: World Trade Organization; CBD: Convention on Biological Diversity; ITPGRFA: International Treaty on Plant Genetic Resources for Food and Agriculture; Government land policies; seed pricing policy; Seed distribution policy; Seed policy, seed law, regulations, guidelines.

Also the same crop will have different seed value operators and supporters in different seed systems. The maize seed value chain as given in figure 1 for the system of Ethiopian public enterprises is different from the maize seed value chain within the system of international companies operating in Ethiopia; operators and service providers are different. Whereas the early generation seed production, seed multiplication and seed distribution are in the hands of different organizations in the public enterprises seed value chain, they are all in the hands of one organization in the case of the international company system. These two chains face a number of common but also a number of different challenges. For example, whereas public seed companies all depend on public breeding programmes for the same few varieties and have no competitive position in the market, international seed companies have their own varieties and a distinct market niche. Also the enabling environment is different, e.g. with public companies regulated by government policies on seed price setting, international seed companies can determine their own seed price.

Applying value chain analysis to seed systems has the advantage that it emphasizes the importance of the farmers, i.e. seed consumers as main drivers of the value chain. Farmers who buy the seed as input for their crop production may be the first operators in a larger product value chain. The commercial seed connects the seed value chain and the product value chain. Well established product value chains often request for quality seed, and are very powerful in pulling seed value chains. For example, in Burundi, the brewing industry wants to have a guaranteed source of sorghum grain for beer brewing, and the brewery is now providing credit for seed and buys back the sorghum grain from farmers. This creates demand for sorghum seed.

Also the enabling environment may be important to promote a product value chain and pull associated seed value chains. In Ghana the beverage industry benefits from a decrease in excise duty when they use locally produced raw materials (maize, sorghum, legumes) as input for their products. Increased demand for locally produced grain also increases demand for seed. This influences various seed value chains in different seed systems.

In contrast to the above indicated market-oriented product value chains and seed value chains, are more supply driven value chains, that are development oriented; see also technical notes issue no 1, highlighting the difference between market -oriented and development-oriented value chains. But even in case of development orientation, seed value chain analysis within seed systems is a useful tool to analyse how specific seed systems can be strengthened.

Within a seed sector assessment that is guided by ISSD, seed value chain analysis is a powerful tool providing ample insights for the development of programmes and policies that match a diversity of realities. This tool follows as second analytical tool in the national seed sector analysis; the first tool identifies and characterizes seed systems.

HOW to analyse seed value chains?

Seed value chain analysis can be guided by a social economist with knowledge and background in the agricultural and seed sector. He/she organizes focus and multi-stakeholder group discussions and conducts interviews with key informants. Participatory mapping of the seed value chain can be conducted with participants drawing and thereby characterizing and analysing the seed value chain that their organizations are involved in. Since different stakeholders in the seed value chain have often very different perspectives on bottlenecks, opportunities, and the potential of different interventions, seed value chain analysis demands participation of a full range of stakeholders involved in the chain. Like the other tools in the ISSD guided seed sector analysis, seed value chain analysis is guided and supervised by the multi-stakeholder team that is responsible for the overall assessment (see technical notes issue no 1). The team shall ensure that the analysis is conducted within distinct seed systems, and that for each seed system relevant stakeholders are involved. Below we describe the steps in seed value chain analysis.

Step 1: Choose a key indicator crop for the respective seed system.

Step2: Write down the operational activities in the seed value chain. Identify the operators for each activity, and give an indication on their performance (column 2 and 3 in table 1).

Table 1: Matrix analysis of operators of the seed value chain in a specific seed system

Seed value chain activities – operations	Operators – stakeholders	Indication of performance	Existing incentives	Profit or profit like incentive	Issues in enabling environment
Plant genetic resource management					
Variety development					
Early generation seed production					
Seed multiplication					
Marketing and dissemination					

Step 3: Identify the services associated with the seed value chain. Specify the associated service providers and give an indication on their performance; see column 2 and 3 in table 2. You may identify additional services.

Table 2: Matrix analysis of services and providers in the identified value chain

Seed value chain activities – services	Service providers – stakeholders	Indication of performance	Existing incentives	Profit or profit like incentive	Issues in enabling environment
Rural extension					
Variety testing and release					
Plant variety protection					
Quality assurance in seed production					
Quality assurance in seed commercialization					
Business management services					
Financial services and management					
Marketing information and promotion					

Step 4: Analyse the incentives for operators and service providers; indicate which incentives are related to profit. (column 4 and 5 in table 1 and 2). Analyse how do incentives, or the lack of incentives, contribute to the functioning of the seed value chain.

Step 5: Identify the elements of the enabling environment and associated incentives for both operators and service providers engaged in the specific seed system. Identify opportunities and constraints (column 5 in table 1 and 2). Note that this step is elaborated in more detail in technical notes issue no 5.

Step 6: Structure a general overview of the seed value chain in a map and link the services and service providers to the operators and activities. Indicate if services are public or private. Indicate flows of information and finance.

Step 7: Through a SWOT analysis assess the overall performance of the seed value chain (table 3).

Table 3: SWOT analysis for specific types of seed system

<i>Positive</i>	<i>Internal</i> <i>(within the control of operators and service providers)</i>		<i>Negative</i>
	<u>Strengths</u> – ... – ...	<u>Weaknesses</u> – Depended to NGO for funding – ...	
	<u>Opportunities</u> – ... – ...	<u>Threads</u> – ... – ...	
	<i>External</i> <i>(beyond the control of operators and service providers)</i>		

Step 8: Based on the SWOT, formulate coping strategies which will help to over weaknesses in the value chain, making use of the opportunities. Select an effective coping strategy through ranking (see table 4). The ranking can be based on:

- Can we make as much use as possible of the Strengths
- How can we reduce as much as possible the Risks
- Expected contribution to the objectives
- Other criteria, like contribution to food security
- Distribute points within the column

The coping strategy with the highest total score is probably the most effective strategy to increase value chain performance. However, discuss the three highest ranking strategies with relevant stakeholders and decide on which one to concentrate.

Table 4: Ranking of coping strategies

Coping strategy	Maximum use of strengths	Least risk in relation to threats	Effective contribution to objectives	Other criteria	Total points
Total (e.g.)	10	10	15	?	

Step 9: Develop an action plan for the selected coping strategy. Indicate which operators and service providers are involved in the intervention strategy and how.

WHAT lessons can be learned?

Seed value chain analysis can clearly pinpoint weaknesses in specific seed systems, providing different entry points for intervention strategies to strengthen the system. See lessons learnt on different entry points below.

Seed systems can be strengthened by facilitating linkages between seed value chain operators. The ISSD-Ethiopia programme facilitated linkages between local seed businesses and public research institutes. Collaboration in participatory variety selection allowed the local businesses to get access to varieties that fit the agro-ecological context in which they operate, and the market demands of their locality.

Another example of promoting collaboration between value chain operators is the Vegetable Oilseed Development Project in Uganda. By bringing public research organizations, private seed companies, agro-dealers and farmer seed users together in a platform, it aims to create farmer awareness on the benefits of using quality seed, as well as to link the seed demand and supply side. Insight in the seed demand is necessary to allow research and seed companies to plan appropriately for the production of the different seed classes, and as such enhance the functioning of the value chain.

In other cases the provision of a specific service can enhance the functioning of the seed value chain. In Nepal the community-based seed production system is very well established. For maize, public research provides communities with basic seed of the appropriate varieties. Communities are skilled seed producers, however, do not have the capacities to market their seed. CIMMYT and public research now support the farmer groups enhancing their business skills and market orientation.

Also tailoring services to seed systems increases efficiency of seed value chains. In many countries the national seed certification service cannot adequately cope with the seed certification demands of all commercial seed produced in the country. Opportunities to increase the efficiency of seed quality assurance, by applying different models to different systems include accreditation of seed companies to do their own seed quality control, and capacity building of local extension agents to supervise seed quality in community-based seed schemes.

An enabling environment is key for the success of seed value chains and seed systems. For example the success and scale of community-based seed production schemes in Nepal is based on recognition of the value of this seed system by the government, which recognizes truthfully labelled seed as a valid source of quality seed. In many countries seed policies and regulations only consider formal seed systems. Another example is the request of international seed companies to governments to arrange functional Plant Variety Protection as a prerequisite to become operational in that country; whereas PVP benefits the private seed industry, it is important to analyse what the implementation of a PVP mechanism means for the functioning of seed value chains addressing informal seed systems.

interactions between the three levels of the seed value chain, i.e. operators, service providers and enabling environment, are driven by incentives for the different stakeholders operating at each level. Such incentives for stakeholders are part of strategies for enhancing chain efficiency. In this aspect profit is a powerful motivator. Promoting seed entrepreneurship, i.e. making business out of seed production and seed services, is an approach to enforce market orientation and sustainability. Entrepreneurs can be recognized in formal as well as informal systems, and in different components of the value chain. An entrepreneurial approach for public actors in seed value chains will increase the effectiveness and efficiency of operations and services.

Well established product value chains often create demand for quality seed. Examples are the poultry industry in Ghana, which is pulling the maize and soy grain market. The grain market pulls the demand for quality seed. A similar example is from Nigeria, where beer breweries now source more than 40% of their maize and sorghum grain locally. This increased the seed demand for these crops, and opportunities for different seed systems to extend.

The lessons above shows that each seed system has its own seed value chain structure with operators and service providers, and enabling environment. In taking the seed value chain as entry point to analyse and improve the functioning of the seed system, seed value chain analysis follows the ISSD approach in taking a pluralistic approach towards seed sector development.

Reading materials

- Louwaars, N.P, De Boef, W.S (2012). Integrated seed sector development in Africa: a conceptual framework for creating coherence between practices, programs and policies. *Journal of Crop Improvement* 26, 39-59.
- Audet-Bélanger, G (2012). Access to finance by smallholder farmers and agro-SMEs in emerging economies, KIT Working Papers Series C6, Amsterdam.
- KIT, Faïda MaLi and IIRR (2006). Chain empowerment: supporting African farmers to develop markets. KIT, Amsterdam; Faïda Market Link, Arusha; and IIRR, Nairobi.

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Technical note

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Annex 1: Main steps and guiding questions for seed value chain analysis

Main steps	Issues and guiding questions
Step 1: Seed system indicator crop	Identify a good indicator crop to study the seed value chain of the respective system.
Step 2: Operations and operators	Identify and characterize the operators in the seed value chain. <ul style="list-style-type: none"> - Who are the operators in the seed value chain? - What are the functions of the operators in the seed value chain? - What is the performance of each operator? - What is the number of operators at each level? - Who are the most influential operators in the chain? (actions and power)
Step 3: Services and service providers	Identify and characterize the service providers in the seed value chain. <ul style="list-style-type: none"> - Who are the service providers? - What are the services provided? - What is the performance of each service provider?
Step 4: Operators, service providers and incentives	Analyse the incentives for operators and service providers <ul style="list-style-type: none"> - What are the marketing strategies of the different operators? - What are profit like incentives for operators - What are other type of incentives? - What are the marketing strategies of the different service providers? - What are profit like incentives for service providers? - What are other incentives? - Where in the seed chain are incentives lacking?
Step 5: Enabling environment	Identify the key issues in the enabling environment. Issues may relate to: <ul style="list-style-type: none"> - Seed policies, laws and regulations promoting or hindering the seed value chain - Import and export regulations - Sector growth; industries pulling seed markets - Trust and accountability Identify in the enabling environment: <ul style="list-style-type: none"> - What are the bottlenecks? - Can they be removed? How? By whom? - What are opportunities?
Step 6: Value chain map	Structure a general overview of the seed value chain in a map. <ul style="list-style-type: none"> - How are operators linked? - Which services are private and which services are public? - What are the links between operators and service providers? - How does seed move between operators? - What are conditions under which seed moves? (contractual arrangements, credit) - How do financial resources flow between stakeholders? - How does information flow between stakeholders? - How do stakeholders communicate? - Are their stakeholders in the value chain who are not currently involved, which should be integrated to increase value chain performance?

Step 7: SWOT analysis	<p>Make a SWOT to assess the overall performance of the seed value chain.</p> <ul style="list-style-type: none"> - What are the strengths? - What are the weaknesses? - What are the opportunities? - What are the threats? - What are external issues beyond the control of service providers?
Step 8: Coping strategies	<p>Based on the SWOT, identify strategies that overcome weaknesses in the value chain, making use of the opportunities. Rank the strategies based on the criteria below and select one strategy:</p> <ul style="list-style-type: none"> - How do strategies make use as much as possible of the strengths? - How do strategies as much as possible reduce risks? - How do strategies contribute to the objectives? - How do strategies contribute to other selected important criteria, like for example food security?
Step 9: Action plan	<p>Develop an action plan for the selected coping strategy.</p> <ul style="list-style-type: none"> - Which are the operators involved in the intervention strategy? - What are their envisioned roles and responsibilities? - Which are the service providers involved in the intervention strategy? - What are their envisioned roles and responsibilities?