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DIAGNOSTICS FOR INDUSTRIAL VALUE CHAIN DEVELOPMENT

An Integrated Tool

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

INDUSTRIAL VALUE CHAIN DIAGNOSTICS:
AN INTEGRATED TOOL

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Foreword

Over the last decades the world has witnessed a gradual relocation of manufacturing activities from developed to developing countries, opening up new opportunities for employment, increased income and economic growth for some of the world's poorer and less developed countries. However, the process of industrialization has not benefitted all developing countries equally. In the 2009 Industrial Development Report, UNIDO makes a distinction between the countries of the "bottom billion" trying to break into global markets for manufactured goods, and the middle-income countries attempting to move up to more sophisticated manufacturing.

New industrial challenges exist for both groups of countries, among these, to i) build up industries so as to benefit from value addition in commodities originating from developing countries, ii) turn non-competitive industries into competitive ones that create income and employment, iii) meet the Millennium Development Goals, particularly the overarching goal of poverty reduction, and iv) make industrial development compatible with a sustainable use of natural resources and the elimination of negative effects on climate change through energy use. However, it is especially the smaller and less developed countries that are increasingly challenged by competition and trade barriers, while at the same time under pressure to introduce new technologies and systems of production. Consequently, less developed countries could lose opportunities to effectively participate in global value chains and may be ill-equipped to compete in national and regional markets.

Industrial value chains are complex both in terms of the various segments they cover (from primary materials to consumption), and the impacts that their progress and development can generate. It is in this context that UNIDO's value chain diagnostics tool aims to provide guidance. The main objective is to draw a complete picture of the chain using a set of diagnostic dimensions, as broad in nature as possible, to describe the current situation in a given context. Once this is established the diagnostics also help to reflect on opportunities and constraints that impact on certain dynamics in the value chain, automatic or induced through governments and development agents.

Industrial value chain diagnostics is a useful tool that assists analysts, programme designers and project managers in country governments and development agencies to formulate industrial policies and development programmes. It helps identify constraints and technological and market opportunities relating to a particular commodity or value chain. Often this tool may also point to an apparent insufficiency of policies and institutions and a lack of service facilities that are preconditions for value chain development. Though the starting points of value chain analysis are frequently practical objectives, e.g., to increase production, introduce new technology, improve processing and expand marketing of a specific product, applied correctly and with a broad enough perspective, industrial value chain diagnostics can lead to sustainable industrial development by contributing to social, economic and environmental goals.

Philippe Scholtes, Director, Agribusiness Development Branch, UNIDO

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Glossary

Competitiveness:

The ability of a firm (or a set of firms that together form a value chain) to offer products and services that meet the quality standards of the local and/or world markets at prices as low as the competing firms while providing adequate returns in relation to the resources used. Competitiveness depends on a wide range of factors that relate to the internal capacities of a firm, the conditions in the value chain and the macro-economic and policy environment, all of which should be part of value chain diagnostics.

End-buyers:

The buyers of products that are not further transformed or processed. Often there is a range of intermediaries, exporters, importers, wholesale distributors, retailers, service providers and brokers involved in marketing and trade. End-buyers are not consumers; they sell to them.

End-market:

The market where the full value of the product is capitalized. This is usually close to where the product becomes available for purchase by the consumers or those who sell to the consumers. End-markets absorb the products of the value chain after no further transformation and value addition is performed. They can be located on domestic markets or abroad

Industrial Cluster:

The geographic concentration of interconnected firms that produce similar goods or services. In a cluster firms may benefit from the use of similar technology, knowledge exchange and/or the presence of supplier, buyer and service infrastructure.

Industrial Value Chain:

A value chain (see below) that engages in value addition by means of processing and transformation of goods, especially via manufacturing. In industrial value chains a considerable share of actors engage in the processing and transformation of primary products into consumable goods generating value added.

Sustainable Industrial Development:

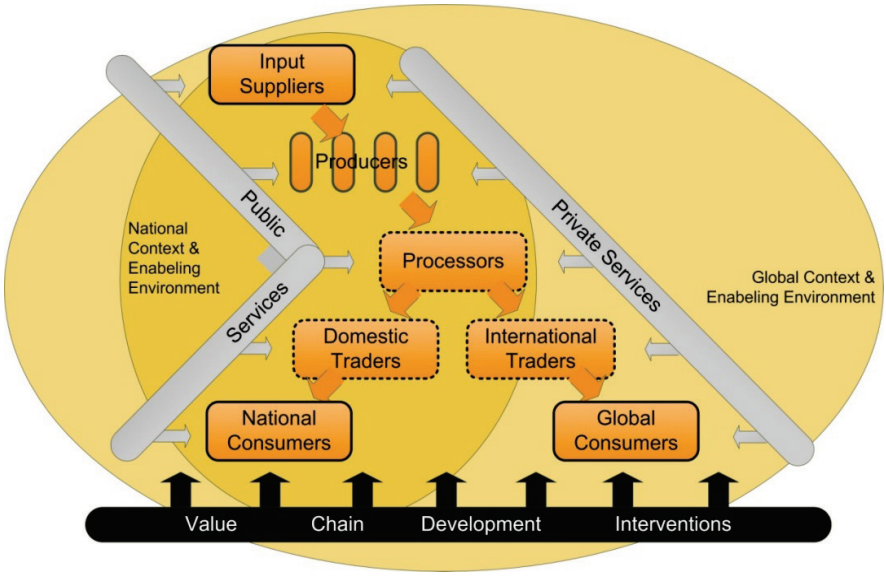
Sustainable industrial development encompasses economic, social and environmental progress in the manufacturing sector. It allows for the growth of industries based on structural long-term improvements related to local manufacturing capacities, environmental performance and living standards.

Upgrading:

Denotes a development path of a firm, a group of firms or an entire value chain in response to efforts to improve their/its position and level of value addition compared to competitors. Though usually achieved through the application of innovations in the form of new knowledge and technologies, upgrading can also result in organizational improvements and marketing strategies. In its broadest sense, upgrading can be viewed as synonymous with positive value chain development. One can distinguish between "product upgrading," which is the innovation, diversification or improvement of the final product, and "process upgrading," meaning improvement in production and in the distribution of technology and logistics. "Functional upgrading" relates to improvements from entering into higher value-added functions in the value chain.

Value Chain:

A mechanism that allows producers, processors, and traders—separated by time and space—to gradually add value to products and services as they pass from one link in the chain to the next until reaching the final consumer (domestic or global). Main actors in a value chain are firms from the private sector. The private sector draws from a range of public services and private technical, business and financial service providers. They also depend on the national and global legislative context and socio-political environment. In a value chain the various business activities in the different segments become connected and to some degree coordinated.



Source: UNIDO (2010). Value Chain Diagnostics for Industrial Development

Value Chain Diagnostics:

A method for understanding how firms under given framework conditions operate and coordinate their businesses to ensure that primary materials are transformed, stored, transported and reach end-consumers in certain form and quality. Value chain diagnostics looks at the existing constraints and opportunities to value chain development, which are multiple by nature. It also looks at the various effects that operations in the chain have on groups of people, e.g., with regard to poverty reduction, employment, income generation, firm development, economic growth, or environmental sustainability.

Value Chain Development:

Refers to the concerted effort to improve conditions in the value chain. It usually implies a change in beneficiaries' participation in value chains, through enhancing rewards and/or reducing exposure to risks. Rewards and risks should be understood not only in financial terms but also in relation to the environment, poverty reduction and gender equality. Value chain development can be considered equivalent to the concept of value chain upgrading, in the broadest sense of its meaning.

Value Chain Governance:

Governance refers to the organization of a value chain and coordination between actors making it possible to bring a product from primary production to end-use. This can include the power and ability with which certain actors in the value chain exert coordination and control along the chain.

Value Chain Segments:

The various parts of the value chain, which are defined by a certain transformation and process of value addition. In the tomato value chain, for example, one may distinguish between the segments of primary production (farming) of tomatoes, processing of tomato dices and paste and packaging in tins, transportation and storage (other than by farmers or processors), use of processed tomatoes in the ready-made food industry, and wholesaling and retailing of tomato products until they reach the final consumer.

Why This Tool?

Value chain development is currently a top priority for many government, private sector and development agencies. Through the development of value chains such agencies expect to reduce poverty and foster the generation of additional income and employment for different groups who engage along the value chain. Value chain development builds on entrepreneurial dynamics that reach out for improved competitiveness and value addition. While integrated sustainable development and poverty reduction constitute the goals, the means to this end, clearly, are improvements in business development in production, processing and sales. Making the link between the two—business development and broader development goals—is in part what this guide aims to achieve.

> ***Take note:*** *Poverty reduction and other broad development goals can be accomplished by different means. This tool focuses on attaining development goals through business development.*

This document offers a tool for diagnosing industrial value chains. It provides guidance on defining the elements necessary for the development and upgrading of entire value chains, not just parts of them. The focus is on industrial value chains, meaning those that engage in the processing and transformation of primary products into consumable goods and thereby generate value added. Unlike conventional value chain analysis, this tool places particular emphasis on the processing and manufacturing segment with its downstream (market) and upstream (supplies) relationships. It adds to the existing literature on value chain analysis[1] by introducing the "industrial perspective" and complements other value chain analysis tools that centre on "primary production" and "market orientation".

The diagnostics can be applied to situations where value chain development has no single or easy solution and many parallel constraints and development opportunities exist. The tool can be characterized as integrated, generic, and rapid:

- *Integrated (or holistic)* in the sense that it considers the dynamics in all segments of the chain and the many possible implications that development within these segments would have for the value chain. It assesses the effects of these dynamics from a broad development perspective (in line with the Millennium Development Goals and UNIDO's vision on sustainable industrial development), as opposed to partial approaches that focus on one or a few constraints to development in the value chain.

> ***Take note:*** *The tool should not be used to justify a predetermined intervention. It is best used in situations where the aim is to put together all of the necessary pieces for value chain development.*

- *Generic* in the sense that it can be applied to any given industrial value chain, regardless of the nature of the product and the actors engaged. However, the tool is not a detailed blueprint for value chain analysis in a specific situation. It is up to the analysts to adapt the tool to specific situations and make further analyses and interpretations.

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[1] Some important value chain analysis tools include GIZ's *Value Links* (www.value-links.de/manual), USAID's *Value Chain Development Wiki* (available at www.microlinks.org), The Valuechains4poor community's *Toolbook for Practitioners of Value Chain Analysis* (available at www.valuechains4poor.org) and the ILO *Guide for Value Chain Analysis and Upgrading* (available at www.value-chains.org).

- *Rapid* in the sense that it is simple and its application can be accomplished in a short period of time, making it an effective way of obtaining relevant information while minimizing costs and working time. The tool therefore is not designed to replace more sophisticated value chain analysis instruments that require substantial resources for data collection and analysis producing highly detailed information that can be used for project implementation.

By applying the diagnostics, programme designers, managers, and other stakeholders in value chain development in the private, public and development/NGO sector can take a "wide angle snapshot" of the value chain and the opportunities and constraints for its development. They may use this information to make strategic decisions at the policy and programme level as to whether interventions in value chain development can and shall be pursued, and at which points. Once these decisions are made, further complementary analysis may need to be conducted to identify project implementation strategies.

> ***Take note:*** *The tool produces information inputs for developing a project design and implementation strategy. More detailed information and feasibility studies may be required to further design a project. The tool provides directions on where additional studies should focus.*

Due to its integrated character the tool also enables various entities in governments and the development community, including UNIDO, to join forces and cooperate in the development of value chains.

The diagnostic tool essentially generates three outputs:

(a) A detailed mapping of the actors in a specific value chain in a given country and the interactions amongst them.

(b) A description of the status of development in the value chain with regard to seven analytical dimensions, including the sourcing of input and supplies, production capacity and technology, end-markets and trade, governance, value chain finance, sustainable production and energy use, and business environment and socio-political context.

(c) The identification of constraints to and opportunities for value chain development leading to strategies to implement and finance interventions among agents that support chain development

The tool has been developed from experiences of various UNIDO branches engaging in the analysis of value chains together with partners in Africa, Asia and Latin America over the last decade. In 2009, a group of value chain specialists from UNIDO and outside identified building blocks for an integrated and rapid analytical tool. The results were presented in the form of a UNIDO Working Paper (Value Chain Diagnostics for Industrial Development). In September 2009 an Expert Group Meeting held at UNIDO brought together leading experts and practitioners in the field of value chain analysis. Participants defined an outline for a diagnostic tool for value chain analysis (Meeting Report: Developing a Value Chain Diagnostics Tool for Common Practice at UNIDO), the starting point for developing the present document. The tool as it stands should be considered a work in progress that will be subjected to further testing and use in the field, leading to adjustments as well as adaptation to specific contexts in subsequent new editions.

How to Use This Tool

This diagnostic tool offers a practical approach to conduct rapid diagnostics of industrial value chains. It presents an analytical framework and rationale, suggests parameters and indicators and gives guidance on collecting data to make results transparent and concrete.

Take note: *The process of value chain development requires stakeholders' active involvement in planning, priority setting and implementation. This tool is meant to complement stakeholder involvement, not replace it.*

The diagnostics derived from using this tool should be seen as part of the wider process of industrial value chain development. This process is by nature participatory and must match development opportunities with demands of potential beneficiaries, other communities, governments, donors, and the private sector. The results of the tool can provide input for project design, implementation, and monitoring and evaluation.

Preferably, the diagnostic tool contributes to programme design at an early stage. However, it is unrealistic to assume that value chain development efforts start from scratch. Usually there are already a number of value chain development interventions in place and one can draw from a large number of studies dealing with different aspects of the chain. Application of the tool can enter at all stages and point to missing pieces in chain development. The tool can also be applied at any point in the project cycle to find out if programmes need to be adjusted and/or complemented to augment development impact (see section 1.4).

Take note: *Data collection in the field is only useful where the information is not already available. The analyst should draw from existing studies and sources of information – though not without critically evaluating the validity of data and collection methods – and combine them with information collected from primary sources.*

The quality of the diagnostics developed with the help of this tool will depend on the type of information it builds on. For meaningful results the users of the tool (hereafter referred to as analysts) will need to engage in substantial data collection. This includes conducting interviews with a range of government officials and other key stakeholders, especially the businesses in the value chain. The analyst may deliberately use existing value chain analyses, which are available in most countries for most value chains, to cover various pieces of information as suggested in the diagnostics framework. However, it is important to verify the information in these documents. Proper organization and processing of this information along the lines of the suggested dimensions and parameters is essential to make the results of the diagnostics meaningful.

Take note: *The tool can be used at any stage of the project cycle to find out if the necessary pieces for value chain development have been brought together.*

The diagnostics can be carried out by analysts associated with governments and development agencies, including UNIDO and partners who engage in value chain development and promotion. These specialists should be familiar with value chain projects and project cycle management, and most likely are capable and

experienced enough to select the elements of this tool that are most relevant, adapting them to the specific context. Given the scope of the diagnostics, it is preferable to form a multidisciplinary team drawing from fields such as engineering, marketing, finance, economics, business administration, and environmental management. Collecting and analyzing the data and writing a diagnostic report can take anywhere from two weeks to a couple of months, depending on the size of the value chain and the level of detail required.

> ***Take note:*** *Collect information as suggested in the tool, and based on this empirical evidence, creatively develop ideas on how to develop the chain and the possible impact.*

This guide is organized as follows:

- Part 1 introduces the analytical framework of the diagnostics.
- Part 2 guides the reader through an initial mapping of the value chain.
- Part 3 introduces parameters and indicators for the seven diagnostic dimensions and gives recommendations on collecting data and developing statements about the current status of the chain. Finally, it provides guidance on hypothesis testing and logical deduction allowing analysts to predict how any development in the chain will affect the different development goals.
- Part 4 explains how to use the information from Part 3 in the context of strategies to implement and finance interventions for value chain promotion and development.

Part 1: The Framework

This part introduces the underlying rationale and logic for this diagnostic tool and presents a framework of diagnostic dimensions to describe the status of the value chain and predict some of the impacts its development would generate.

1.1 Value Chain Diagnostics: Getting the Whole Picture

Value chain analysis has been used by many governments and development agencies to detect opportunities for growth and development associated with certain commodities, products and services. UNIDO itself has been researching the dynamics of industrial value chains and has developed tools for value chain development and related challenges of fostering competitiveness, upgrading and clustering in sectors such as cotton and textiles, furniture, leather, agroindustry, energy, and others.

Nowadays many tools for value chain analysis and development are available (for a list see the 2009 UNIDO publication *Value Chain Diagnostics for Industrial Development*). After mapping the chain, however, most are slanted toward a specific purpose (e.g., market access, inclusion of the poor, enterprise development, or compliance with standards) and feature certain technical expertise. In other words, most existing tools for value chain analysis are not integrated or holistic in nature; they do not provide a broad enough perspective that takes into account all segments of the value chain and possible impacts of its development.

For example, an analysis of the shoe value chain in a West African country might focus on "technological bottlenecks," i.e., deficiencies and inappropriate use of leather cutting and sewing equipment. Another type of analysis might focus on requirements in order to sell local shoe products to buyers from other African countries. Each of the two analyses is partial in nature.

> ***Take note:*** *Tools for assessing value chains are plentiful, but few focus on industrial value chains and have a scope broad enough to identify a wide range of development constraints and opportunities while also considering impact.*

Such partial perspectives in value chain analysis can lead many policymakers and development planners to ignore necessary ingredients of value chain development. They may also underestimate the complexity of the effects value chain development may have on different groups of people, including the intended primary beneficiaries and others. In consequence, many decision makers may engage in too few or erroneous value chain development interventions and no development impact is ultimately attained because certain complementary interventions are missing.

Value chains encompass all the activities and interactions required in the creation of a product or service, from primary production to transformation to commercialization and end-consumers. The term "value chain" refers to the process of continued addition of value that occurs while the product passes from one actor in the chain to the next, gradually increasing its degree of transformation. Main actors in a value chain are suppliers, producers, processors, marketers and buyers. They are supported by a range of technical, business and financial service providers. In a value chain the various business activities in the different segments become connected and to some degree coordinated.

Value chain diagnostics is a method for understanding how actors under given framework conditions operate and coordinate their businesses to ensure that primary materials are transformed, stored, and transported and reach, in certain form and quality, end-consumers. Value chain diagnostics also looks at the various effects that operations in the chain have on groups of people, e.g., with regard to poverty reduction, employment, income generation, firm development, economic growth, or environmental sustainability. Common questions that value chain analysis seeks to answer include the following:

- Who are the actors that participate in businesses across value chains?
- Are there actors that coordinate activities in the overall value chain?
- What are the contractual arrangements under which actors buy and sell products?
- How do actors exchange information and learn about solutions to improve products and business performance?
- What technical, business and financial services are available to support actors in the chain?
- How much value do actors add to the product in the different steps in the chain, what are their costs and how is this value distributed?
- What are the power relations in the chain and to what extent do they determine how economic gains and risks are distributed among chain actors?
- What kinds of barriers exist for firms to enter the value chain?
- What is the level of competitiveness of firms in the value chain?
- What bottlenecks exist and what opportunities are available for development (upgrading) of the value chain?
- Which policies and institutions constrain/support chain actors and facilitate value chain development?

The results of the diagnostics can inform government officials and key stakeholders as to whether interventions should be considered, and in which parts of the value chain. They also can provide insights on how those interventions should be designed. For example, constraints and opportunities in cost reduction and product improvement can be identified, or options for achieving better coordination among chain actors. Hence, value chain diagnostics can form the basis of policies and programmes that foster chain development. Finally, value chain diagnostics can also point to interrelatedness and synergies among different interventions and help with partnership-building and the provision of complementary services.

1.2 Diagnostic Dimensions in Industry Value Chains

An integrated framework for value chain diagnostics must be able to depict the status of value chain development in a wide range of aspects/diagnostic dimensions. Reviewing common practices in value chain analysis, four partly overlapping approaches can be distinguished:

a) The *strategic management* and *business administration* approaches, which look at supply chain management and development of the individual firm. The focus is often on a) actors that hold important positions in the value chain, particularly buyers of end-products and providers of major inputs; b) the contractual relationships that firms maintain with these buyers and suppliers; c) the logistical

services that certain firms are able to provide, e.g., with regard to transport; and d) the level of competitiveness of the chain and its individual actors.

b) The *industrial cluster development* approaches, which assume that spatial organization, strategic firm alliances, and networking are sources of systemic competitiveness. Their analytical focus is often on: a) how actors network to exchange goods, services, and information; b) institutional and political frameworks that promote building industrial clusters and the inclusion of small-to-medium-sized firms; and c) the level of knowledge and technology used.

c) The *global value chain* approach, which emphasizes economic returns and governance structures, determined, for example, by the dominance of buyers and retailers operating internationally. Here the analytical focus is mainly on: a) the dynamics of upgrading and value creation; b) power relations in the chain determining how economic gains and risks are distributed among chain actors and how certain actors face barriers of entry; and c) governance and management structures that allow the value chain to function and deal with coordination, competition, and technological improvement.

d) The *innovation systems* approach, which assumes that access to knowledge and technology and opportunities to use them allow actors to participate in value chains. The analytical focus here is frequently on: a) building individual and collective competences among value chain actors; b) networks of knowledge exchange, joint learning and technology development; and c) the institutional and policy frameworks that create an enabling environment for chain actors to develop and use innovations.

An integrated value chain diagnostic must allow for a combination of these dimensions, at least, but they fall short in the context of industrial value chains, where aspects of finance and investment, cleaner production, and macroeconomic and policy framework conditions must also be dealt with. On the basis of these considerations and UNIDO's experience, this tool suggests using the following seven overlapping diagnostic dimensions to analyze industrial value chains:

1. **Sourcing of Inputs and Supplies**: Here the emphasis is on understanding the sources of products and services that firms use in production and the relationships with providers of primary materials and inputs in the industrial process. Sourcing can involve various steps as the final product of a processing plant can be the input of another factory that transforms the product further. The focus on sourcing and supplies looks towards the origin of the product.

   Take note: The analyst needs to look upstream at the inputs and supplies that are brought to the transformation process, all the way to the origin of primary raw materials.

   Example: In Brazil's bio-ethanol industry distilling plants rely on a single important primary product, sugar cane. In order to operate efficiently the plants need to receive sugar cane at the factory gate every day in large quantities. However, the quantities delivered must not surpass daily processing capacities. In order to organize the reception of sugar cane logistically, factories establish contractual relationships with the sugar cane producers specifying "windows" when producers must deliver certain quantities of sugar cane. These contracts also specify the minimum quality, an additional condition that ensures cost-effectiveness in processing.

2. **Production Capacity and Technology:** Here the emphasis lies on understanding the firms' capabilities to manufacture and transform goods, including the means of production (machinery), human capital and the knowledge and technologies used in production. Often indicators of technical productivity, cost-efficiency and profit margins are used to describe and compare productive capabilities.

   Take note: *The analyst needs to look at the knowledge and technologies used to transform products and the efficiency with which this is done relative to competitors.*

   Example: The cotton processing industry in West Africa is challenged to improve its technological capacity. While processors in Asia, particularly China, continuously modernize ginning, spinning and weaving facilities, most processors in West Africa are unable to reinvest in machinery. Nor can they reach full capacity utilization due to competition with imported textiles from Asia and second-hand markets in Europe. In consequence, unit costs are too high to generate sufficient profits for reinvestment. However, lack of reinvestment makes it even harder to compete with imported textiles. Unless substantial investments in technology use are promoted, the West African cotton processing industry will not revive.

3. **End-Markets and Trade:** Here the diagnostics look at the markets that ultimately absorb the products of the value chain and the product quality demands of those markets. Finally, the analyst needs to understand existing capacity in the value chain to meet demands and access existing and potential markets. End-markets can usually be divided into a range of market segments that absorb different types of products of the value chain (e.g., higher-priced quality products or lower-priced bulk products). For each type of product a range of buyers may exist. Traders engage in bringing the product to the buyers. Certain buyers may also require compliance with standards and licensing.

   Take note: *The analyst needs to look downstream at the end-buyers and traders that bring value chain products to the consumer, their stipulations in response to consumer preferences, and standards and regulations that need to be complied with in order to access existing and potential markets.*

   Example: Zambia has been successful in marketing fresh vegetables to European supermarkets, particularly in the UK, but entering the market of the European Union has been a long and difficult process incurring substantial costs. First, producers needed to comply with EU legislation on import of agricultural goods and food products, entailing various types of certification and import licenses. Additionally, supermarkets requested compliance with certain protocols such as EUREP-GAP, and the pertinent certification for organic products. Complying with these standards meant Zambian producers had to adopt a new production system, and only a portion of the traditional small-scale farmers were able to do so. Support to comply with the standards came also from the supermarkets, but was mainly the result of development cooperation efforts in collaboration with the Zambian Government.

4. **Governance of Value Chains**: Analysis of relationships with suppliers and buyers (dimensions 1 and 3) often does not cover the complex interdependencies between actors in the value chain. The focus of the diagnostics concerning chain governance is on the rules and regulations that determine the functioning of and coordination in a value chain, existing barriers to entry and the dominance of

certain agents such as buyers, suppliers or trade agents. It also relates to the contractual and informal relationships between the various actors in the chain that help businesses operate efficiently, and absorb and diffuse knowledge, technology and competencies.

Take note: The analyst must look at organization and coordination in the value chain, as well as the dominance of certain actors that can impose production conditions and product specifications.

Example: Indonesia's shoe industry has become a major player in the global shoe value chain and constitutes a major employer in the national economy. The industry has built up substantial capacities among medium to large manufacturers, often organized in geographical clusters. A whole set of supporting services such as transport, financing, packing, etc., have located around the manufacturers. Learning and technology development among those actors in the clusters has been substantial. However, competition on the international market is substantial. International retailers and branders can exercise power by dictating prices and stipulating type of product. In case of non-compliance or in view of cost-efficiency arguments they can quickly change their providers. In consequence, salaries are lower than in other industries and working conditions often lag behind international standards of decent work.

5. **Sustainable Production and Energy Use:** Traditionally firms may have viewed environmental issues as an additional burden. However, awareness is now growing in that with regard to the environment, there are also risks to consider and opportunities to be had in saving costs and exploring new markets. The aim in this part of the diagnostics is to see if actors in the value chain comply with standards of environmentally sustainable production, take advantage of opportunities to reduce lavish use of resources, and apply cleaner production and energy-efficient technologies.

Take note: The analyst should look at the degree to which processes and products use cleaner and energy-saving production technologies and comply with standards of environmentally sustainable production.

Example: A number of years ago the tomato industry in Morocco was challenged to reduce agrochemical contamination (resulting from pest control and use of preserving agents during storage) in order to comply with newly established import regulations in the European Union. Through investments in the application of pest control and storage technology, not only did the country meet food safety requirements for imports to Europe, but also reduced production and storage costs, improving the industry's position vis-à-vis competitors in other Mediterranean countries.

6. **Finance of Value Chains**: The emphasis here is to understand how the various actors in the value chain finance their operations, the appropriateness and sufficiency of available finance mechanisms and how delivery can be made more efficient. A distinction must be made between credits provided by formal financial institutions such as banks and microcredit agencies, and informal financing through loans and advanced or delayed payments in buyer-supplier relationships. The existence of triangular relationships between buyers, suppliers and financial institutions may be an indicator for advanced finance mechanisms.

Take note: The analyst must find out how actors in the various segments of the value chain finance their operations, if available mechanisms are appropriate, and if volume of financing is sufficient.

Example: In Honduras' coffee value chain, producers deliver green or dried coffee to processors who husk, clean and sort the beans. Usually the processors provide informal credit, often via purchasing agents, so producers can buy fertilizer and pesticides, pay labour for harvesting, and organize the transport of beans to the processing plant. The loan is paid back upon delivery of the beans. Processors deliver the processed coffee to exporters in the port city of San Pedro Sula and often receive one- to three-month payment advances as a means to refinance the purchasing of beans from farmers. Alternatively, producers can get fertilizers and pesticides from shops and delay payment (around 3 months) until they sell the beans to the processors. However, shops only provide this facility to very trustworthy customers. The shops are often financed through the agents selling the inputs who can allow delayed payment. Since all these informal credits come with high costs (up to 4% interest per month), producers often search for sources of formal financing at banks and microfinance institutions. Recent efforts by the government and development community to facilitate access to such formal finance mechanisms have substantially improved the situation of many coffee producers. Farmers can invest more in production and technology, and national production has increased while the quality ratings of Honduran coffee in the world market have improved.

7. **Business Environment and Socio-Political Context**: The aim of the analysis here is to understand how given policies and institutions may constrain businesses in the value chain and what public institutions can do to support the development of the value chain. It also refers to the trade regimes and regulations for importing inputs and exporting products, the availability of public and private support services, and the business culture of public and private actors.

   Take note: The analyst needs to look at all of the conditions set by governments and institutions that determine how businesses operate in the value chain.

   Example: The furniture industry in Nepal includes a few modern factories, hundreds of small workshops, and thousands of individual carpenters. Furniture from Nepal has export potential, since it can come in traditional styles that are attractive to modern consumers. Given the high degree of embodied value added, furniture is able to overcome the challenge of high transport costs in the country (many villages can still only be reached on foot or hoof). However, logging is in the hands of state companies and there is a shortage of raw material due to government policies that favour forest preservation over logging and reforestation. Meanwhile the business climate is adverse due to government taxation policies, rudimentary accounting practices and difficulties in finding good tools and machinery on the local market due to high import taxes. Overall, under the current framework conditions, there may be little scope for the furniture industry to develop.

For each of the seven dimensions the diagnostic tool suggests collecting information on a number of parameters (see Figure 1 below), which will be detailed in Part 3. The main idea is that information needs to be collected for each of the parameters to ensure that the diagnostics have the integrated character desired.

Figure 1: Diagnostic Framework for Industrial Value Chains	
DIAGNOSTIC DIMENSIONS	PARAMETERS
Mapping	0.1 Product 0.2 Value chain actors and their functions 0.3 Flow of product and end-markets 0.4 Business interactions 0.5 Service provision
Dimension 1: Sourcing of Inputs and Supplies	1.1 Primary product characteristics 1.2 Characteristics of primary producers and input providers 1.3 Contractual arrangements 1.4 Logistics 1.5 Infrastructure and transport facilities 1.6 Communication
Dimension 2: Production Capacity and Technology	2.1 Production capacity 2.2 Technology 2.3 Knowledge use 2.4 Costs and margins 2.5 Innovation
Dimension 3: End-markets and Trade	3.1 End-product characteristics 3.2 Consumer demand 3.3 End-buyer perspectives 3.4 Marketing and trade capacities 3.5 Standards
Dimension 4: Governance of Value Chains	4.1 Actor domination 4.2 Participation in and distribution of value addition 4.3 Cluster concentration 4.4 Type of governance
Dimension 5: Sustainable Production and Energy Use	5.1 Use of materials 5.2 Energy use 5.3 Use of water 5.4 Effects on bio-diversity 5.5 Emissions 5.6 Waste management
Dimension 6: Value Chain Finance	6.1 Financial attractiveness 6.2 Financial risks 6.3 Norms and practices 6.4 Availability of financing 6.5 Financing gaps
Dimension 7: Business Environment and Socio-political Context	7.1 Business environment 7.2 Product and trade regulations 7.3 Public and private service provision 7.4 Social and cultural context

The concept of “competitiveness” is frequently used in value chain development, and it is useful to indicate how it relates to the above framework. Competitiveness can be understood as the ability of a firm (or an entire value chain) to offer products and

services that meet the quality standards of the local and/or world markets at prices that are competitive while providing adequate returns in relation to the resources used. Competitiveness is determined by a wide range of factors that depend on the internal capacities of a firm, the conditions in the value chain, and the macroeconomic and policy environment. The concept can be extended from the firm to the level of value chains and entire countries. On the national level, UNIDO, for example, defines competitiveness as the *capacity of countries to increase their industrial presence in domestic and international markets while developing industrial structures in sectors and activities with higher value added and technological content (UNIDO Industrial Development Report 2002/2003).* From a systemic point of view, competitiveness depends on the conditions encountered in all of the seven dimensions introduced in the above diagnostic framework. In other words, industrial value chain diagnostics reveals information on the overall systemic competitiveness in the value chain. However, a more narrow definition of competitiveness, for example as a cost advantage in a technological production process, will feature production and technology and markets and trade in the first three analytical dimensions on input and supplies.

1.3 Linking Diagnostics to Development

This tool promotes a type of diagnostics that is integrated in nature and focused on a broad understanding of the constraints to and impacts of value chain development in relation to a set of commonly accepted development goals. The section below discusses the relation between value chain development and development goals.

Development goals vary among countries and governments. However public sector management today has converged on a set of commonly agreed goals among governments across the developing world and main development agencies, such as economic growth, balanced social development, income and employment, livelihood improvement, firm and private sector development, environmental sustainability, food security, contribution to state budgets, and efficient and effective public institutions. Probably the most-accepted set of development goals nowadays is the Millennium Development Goals (MDGs). The interpretation and relative importance of the different goals in the MDG framework, however, may vary among countries.

Industrial development, typically, is able to meet a sub-set of any commonly agreed set of development goals such as the MDGs. This is reflected, for example, in the vision statement of UNIDO, the only UN organization fostering industrial development:

> *"....UNIDO supports developing countries in reducing poverty through productive activities, improving their capacity to trade and gaining access to international markets, and through energy access for the poor as well as promoting energy efficiency and renewable energy to fight climate change."*

In fact, while all of the MDGs may be of global importance, UNIDO emphasizes its commitment particularly to MDG 1: Eradicate Extreme Poverty and Hunger; MDG 3: Promote Gender Equality and Empower Women; MDG 7: Ensure Environmental Protection; and MDG 8: Develop a Global Partnership for Development.

However, development goals that are commonly applied by governments and development agencies to industrial value chain development are often more disaggregated. In a review of common practice in value chain development UNIDO found that the following objectives are common in industrial value chain development:

- Develop technological, organizational and marketing solutions to extend production and sales of firms in a value chain.
- Reduce barriers of entry and facilitate the participation of those who are not included in or profit from value chains and enable them to benefit from value addition.
- Develop value chains where a significant number of small and medium-sized firms and poor workers participate and thus profit from development.
- Identify and support key players and the provision of key services in order to foster development of actors in the entire value chain.
- Develop and manage technologies in such a way that they enable a more energy-efficient and cleaner production and compliance with environmental standards.
- Foster collaboration and vertical integration between different actors in the value chain and improve chain governance and management.
- Improve regulatory frameworks and induce policy reforms to create an enabling environment for value chains to function.

Linking these objectives to the context of industrial development, one can derive five major goals for "industrial value chain development":

1	*Reduction of poverty* in general and/or targeting certain vulnerable groups in the society
2	*Income generation and employment creation*, in general and/or for certain groups in the society, while also complying with the criteria of decent work
3	*Promotion of economic growth* through the creation of competitive industries and businesses in certain regions and/or sectors of the economy
4	Development of productive firms, especially small-to-medium sized, and their *involvement/inclusion in* local and global *value chains*
5	*Promotion of cleaner production* and *better environmental performance* including the application of standards for increased environmental sustainability

Any type of value chain development impacts in various ways on the attainment of these general development goals. Value chain diagnostics can help to understand how. For this purpose the diagnostics must not only depict the chain in its current form, but also its possible evolution in reaction to development interventions.

The above goals necessarily must not contradict each other, but can be synergetic. For example, focusing on employment generation in Zambia's export-oriented vegetable chain can also lead to positive effects with regard to poverty reduction, creation of competitive businesses, involvement of small packing firms and, in the case of ecologically certified products, promotion of cleaner production. In other cases, however, putting the emphasis on one goal, for example economic growth, can be detrimental for the attainment of other goals. For example, although promotion of the salmon industry in Chile brought economic growth and employment, the artisanal fishing industry came close to extinction because of the contamination from the big salmon farms.

One crosscutting issue, particularly related to the two first goals, is contribution to gender equality. Often interventions in value chain development will affect women and men's respective shares of value added differently. In many cases, women may be excluded from gaining higher incomes in value chains. Gender-sensitive value chain diagnostics should look into the effects of the prevailing dynamics on men and women. One way of doing this is to disaggregate impacts along gender lines, and see how men and women are affected with regard to income, employment and empowerment.

Most probably, it will be difficult to obtain information proving that given improvements in the chain have certain development impacts. However, a qualitative assessment of cause and effect relations can be instrumental in approximating impacts. The matrix in Figure 2provides a schematic illustration of how the various dimensions for improvement in a value chain could affect a given set of development goals. The categories are generic and the data is purely hypothetical.

Figure 2: Relationship Between Value Chain Dimensions and Development Goals

	DEVELOPMENT GOALS				
VALUE CHAIN DEVELOPMENT DIMENSIONS	Poverty Reduction (genderized)	Employment and Income (genderized)	Economic Growth	Firm Development	Cleaner Production & Environmental Sustainability
Improved sourcing of inputs and supplies	+++	++	+++	++	-
Improved production capacity and technology	+	++	+	++	++
End-markets and trade	- -		+	+	
Improved governance of value chain	+ +	+	+	++	
Improved sustainable production and energy use	-	+	++	-	++
Value chain finance	++	++	++	+++	+
Improved business environment and socio-political context	+	+	+++	+	++
TOTAL	+ +	+	+ +	+ +	+

+ Slightly positive ++ Positive +++ Very positive effect
- Slightly negative - - Negative - - - Very negative effect

Ultimately it is up to policymakers to decide if there are priorities among goals and if attaining one goal can really compensate for lesser achievement in another. A number of multi-criteria priority-setting tools (e.g., weighting, balanced scorecards, analytical hierarchy process, etc.) are available for that purpose.

Often policymakers expect value chain diagnostics and analysis to inform a process of selecting a value chain. This is consistent in situations where there is sufficient choice among a set of given value chains and enough scope to conduct full-fledged parallel diagnostics for each of these chains. However, in most cases value chain diagnostics is conducted in situations where:

- The selection of the chain is already pre-determined. In such cases the diagnostics is used more as a validation of the existing value chain and will only be considered if it confirms the given choice.
- The selection of the chain is subject to a highly politicized process. In these cases the diagnostics will only provide one piece of information in the decision-making process, with the others provided by various stakeholders and interest groups. Stakeholders in the process may try to use or suppress the results of the diagnostics.
- The selection of the value chain is based on a preselected goal/set of preselected goals (other than the five mentioned above). In these cases, the diagnostic risks being ignored; for example stakeholders may argue that the results of the diagnostics are not relevant.

However, a strong argument can be made that in all three situations described above, the diagnostic tool suggested has crucial contributions to make to the process of value chain development. This is not only because value chain diagnostics provides information to rationalize the political process of choosing and validating value chain development by re-introducing commonly agreed development goals whose relevance cannot be denied. Value chain diagnostics also informs the design and implementation of chain interventions, since it emphasizes the various elements that need to be put together for successful value chain development.

1.4 Diagnostics as Part of the Value Chain Development Cycle

Value chain diagnostics is usually part of a dynamic process of value chain development. Interventions in this process usually come in the form of projects that go through distinct phases of a project cycle. These phases are not linear and must not be applied in step-wise manner. Instead, chain developers can go back and forth through those phases, drawing from a number of feedback mechanisms. The main phases of this process and how value chain diagnostics can contribute to them are described below.

- *Value Chain Selection:* During this phase information is collected and stakeholders are consulted so that policymakers can make a choice from a broader set of value chains. The selection process is inherently subjective, and there is always a danger of selecting a value chain for the wrong reasons. There are a number of tools available for value chain selection that will not be specified here (see Evgeniev and Gereffi 2010, GTZ 2007, USAID no date[2]).

> ***Take note:*** *Selection of a value chain should be as little subjective as possible, and value chain diagnostics can help by pointing out potential development opportunities and needs and possible impacts. There are no guarantees that the desired development goals will be attained as a result of the choice. This will still depend on how the project is implemented.*

[2] *Evgeniev, E. and G. Gereffi (2010). Background report: Identification of a priority value chain. World Bank: Washington, D.C. November 2010. GTZ (2007). Value Links Module 1: Selecting a Value Chain for Promotion. USAID (no date). Value Chain Selection. Micro Links Wiki, USAID.*

The criteria of choice usually relate to common development goals. The value chain, for example, is chosen on the basis of its potential for growth and competitiveness or its potential impact on employment and income. Some goals may be competing; for instance, environmental sustainability might only be attained at the cost of less rapid economic growth. Others can be achieved simultaneously, and there can be much spill over from one chain to the other. Potential impact must be also balanced with the likelihood of success, as some development is just too costly or difficult to achieve. Crosscutting objectives such as conflict mitigation, gender equality and food security may also be considered as criteria. A frequent misconception is that a certain set of predefined development goals will be attained through the choice of a value chain, but in fact, whether the chain develops will depend on the type of interventions. In any case, the selection process should always try to minimize subjectivity, and integrated value chain diagnostics can be instrumental for this. In particular, the diagnostic is able to rationalize the choice of development goals and improve understanding of cause and effect relationships. Value chain diagnostics can also be used to validate choices that have already been made.

> ***Take note:*** *Value chain diagnostics can contribute to the phase of strategy development and intervention design by providing basic information on where and how to intervene to foster chain development. It can also help to develop cause and effect relationships and logical frameworks.*

- *Value Chain Analysis:* The information gathered in the value chain selection process is usually not sufficient to understand all the constraints and opportunities for development. In order to develop strategies and interventions, one usually needs to gather additional information and assess the feasibility of certain strategies in light of the implementation context. Detailed value chain analysis will usually look at both the status of development in the value chain, and potential solutions for its development. The diagnostic tool provides a framework of analysis emphasizing a broad set of analytical dimensions. However, the information gathered based on the procedures suggested in this guideline may not go far enough, calling for additional in-depth analysis for a closer look at issues such as technology, economics and markets. For example, in order to understand the specifications of a product to be developed, a detailed consumer study may need to be conducted as part of the analysis. Or a project that tries to improve the capacities in a processing cluster may need detailed information on the technology to be used, e.g., product throughput, energy consumption, time for maintenance, etc.

  > ***Take note:*** *The advantage of the diagnostics suggested here is that information is collected on all the dimensions of value chain development. However, more in-depth information may be needed in order to design interventions, calling for additional feasibility studies.*

- *Development of Strategies and Design of Interventions:* Value chain analysis provides information on cause and effect relationships in causal models (logical frameworks) that explain how project interventions will lead to development of the chain and what impact this may have. Strategy development and intervention design will eventually need to draw from additional and more detailed information than what is collected in value chain diagnostics. In any case it is certainly the phase where future direct and indirect beneficiaries and other stakeholders will need to be engaged, not only to "buy into the project," but also to find out how

they will be affected and how they can contribute to the development. Methods and sufficient resources to facilitate stakeholder participation are crucial here.

- *Implementation of Chain Development Interventions:* Interventions towards the development of the value chain are usually formulated in project implementation plans. Due to the prevalent dynamics in value chains where new market conditions, new players and technological innovations occur rapidly, it is important to remain flexible and adjust interventions and design additional ones as required. Coming in with value chain diagnostics at a point where part of a project is already implemented can reveal additional value chain development opportunities and challenges as well as potential impacts that have not yet been considered. Value chain diagnostics can even help in designing and implementing value chain development interventions that are complementary to the existing interventions, rendering them more integrated, systemic and synergetic.

  Take note: *Value chain diagnostics can inform the implementation process to the extent that new and complementary actions can be identified that are necessary in the development of the chain.*

- *Monitoring and Evaluation:* Project managers, governments and donors need information to be able to judge and improve the effectiveness of project strategies and interventions. This is usually achieved through a monitoring and evaluation system that starts by collecting baseline information on certain development indicators and assessing their performance over the period of the project and beyond. Often these systems are focused on immediate project outputs and outcomes, causing various development dimensions and potential impacts occurring in the chain to be overlooked. In this context value chain diagnostics can help in setting up monitoring and evaluation activities that take on board indicators for an integrated examination of value chain development. Value chain diagnostics can even be instrumental in collecting and analysing such indicators in the initial phase (baseline study) as well as during and after implementation.

  Take note: *Value chain diagnostics can help identify appropriate indicators covering various aspects of value chain development. It also can help to collect and analyze information required for monitoring and evaluation.*

From the above it becomes clear that value chain diagnostics as suggested in this tool can inform the process of developing and implementing value chain development interventions in their various phases. It contributes to a rationalization of the process and assures that development goals are met.

Part 2: Mapping the Chain

Chain maps are the core of any value chain analysis. This part explains the procedure for mapping a value chain as a first step in the diagnostics. The procedure presented is not a specific UNIDO method, but a composite of common approaches and experiences in chain mapping that have been gathered and summarized by GTZ, DFID, UNIDO, USAID, the World Bank and other organizations (see links in the resources section).

A value chain map illustrates the way the product flows from raw material to end-markets and indicates how the industry functions. Mapping is about drawing a preliminary visual representation of the structure of the value chain and detecting its main characteristics. The procedure not only involves the visual map, but a narrative description of the main characteristics of the value chain (see Box 1 for step-by-step guidance). Part 3 will pick up on the information from the mapping exercise and add additional layers of analysis.

Objectives of the Diagnostics

The objective of this first part of the diagnostics, the chain map, is to get an overview of the actors and their functions in the value chain and the flow of products through the chain. Chain maps can also provide information on the supporting functions in the value chain.

Guiding Questions

- What is the nature of the product(s) that define(s) the chain?
- What are the core functions (processes of transformation) in the value chain?
- Which types of actors participate in the value chain, what functions do they perform, and how many are there?
- How do actors interact and organize the transaction of products?
- Through what channels do products flow to end-markets and what are the volumes of these flows?
- What types of supplies and services feed into the value chain?

Useful Parameters

The following diagnostic parameters should guide the analyst in the mapping exercise, particularly in the collection of information and data:

Product: In the very beginning one needs to define the nature of the product whose value chain is to be analyzed. It makes a difference if a product is raw or processed. For example, the cotton value chain reaches into a large number of products such as yarn, garments, and oils and cake from cotton seed. If the focus is on a product with a higher degree of transformation, such as t-shirts, then the chain traces back to raw materials such as cotton but also other materials like dyestuff, colouring matter, and plastic for packaging, as well as the cutting and sewing machinery.

Functions: The generation and marketing of each industrial product involves a number of different transformation processes. It is the function of the different firms engaged in the value chain to carry out these processes; through this value is added and the

product transforms and finally reaches the consumer. Depending on the product, these processes can be very different. For example, it takes many steps to put a mechanical watch together and many firms are involved in order to produce raw materials, such as metal and gold, assemble clockworks, and put together the final watch. In contrast, producing a plastic bucket often can be performed by one company which mixes the raw material, polyethylene, puts it into moulds, and assembles the handle to the bucket. Common functions in value chains are input supply, production, assembly, processing, wholesale, export, retail, etc., and sub-functions may be defined in each.

Value chain actors: These are the firms and individuals who assume different functions in the value chain, engaging directly in production, processing, trading and marketing. They usually become the owner of the product and/or take active market positions. In value chain mapping one would define certain categories of actors such as, in the cotton value chain, primary producers, ginners, garment manufactures, and branders, and attribute different functions to them: primary production, transport, primary processing, manufacturing, and retailing, for example. Often certain actors can have more than one function.

Flow of product and end-markets: These establish the main connections between the different actors in the value chain. It may be sufficient for a generic map to depict which types of actors deliver products to each other. However, frequently it is also interesting to find out how many products are delivered. The map should also indicate the end-market(s) to which products flow. Often different end-markets source products through different combinations of actors and it is important that the map show these sourcing patterns.

Business interactions: The mapping exercise should moreover reveal information about the type of business transactions actors engage in. Usually, for products to pass from one to the other, firms establish certain contractual arrangements. In the automotive industry manufacturers establish contracts about the quantity and type of product to be delivered by the provider up to a year in advance. This allows the providers to organize manufacturing of their products. As another example, vegetable growers often engage in contract farming, where a supermarket or food processing company stipulates production protocols to ensure stable quality and characteristics of primary products.

Service provision: The map should include reference to the types of services that support the functioning of the chain, including transportation, packing and handling, business services such as consulting and accounting, quality and process certification, financial support, etc. It may be useful to mention the main types of actors that provide these services, when these are not directly actors in the value chain.

Data Collection

Mapping starts by drawing an overview of the entire value chain. The data for this exercise can be obtained from desk research and basic knowledge. This initial map should then be adjusted as information is gathered from various firms and other stakeholders in the chain. Often it is useful to discuss the graphical representation of the chain directly with stakeholders and/or ask them to draw the map according to their own perception.

Box 1: How to Draw a Chain Map

STEP 1 Collect information through desk research.

STEP 2 Define the various functions that occur in the value chain such as input supply, production, assembly, processing, wholesale, export, retail, etc. Separate the functions graphically in segments, e.g., starting with input supply on the left moving to retail on the right.

STEP 3 Specify types of actors and allocate them under the different functions. Use types of actors rather than individual firms. Some actors can cover more than one function.

STEP 4 Put in arrows representing the flow of products from one actor to the next and include information on the type of contractual arrangements.

STEP 5 Specify end-markets and relocate actors and arrows accordingly. Define market channels, with end-markets at the end of the map.

STEP 6 Include generic categories of support services: financial services, transport, packaging, etc. Arrows can show which actors benefit from these services. Information can also be included identifying the main providers of these services.

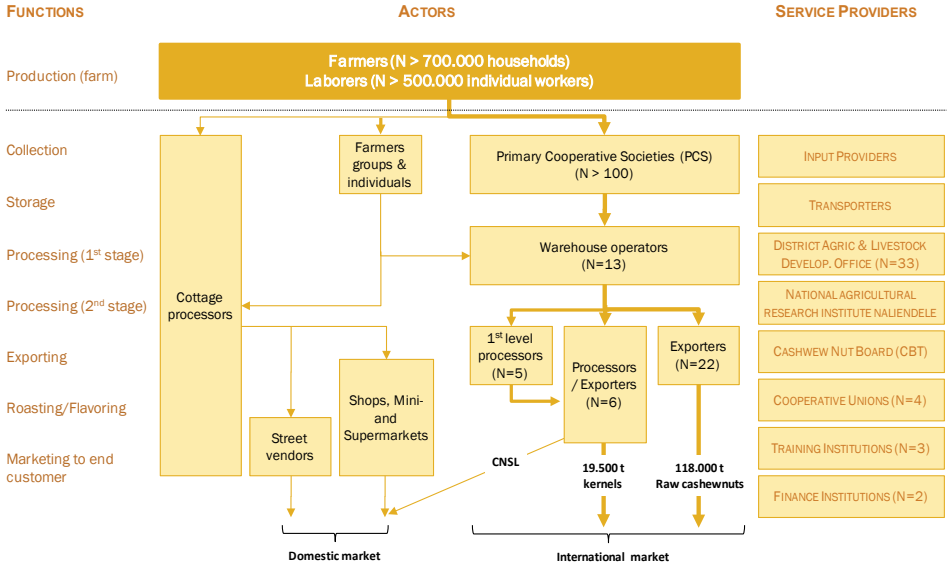
STEP 7 Add data overlays when information is available, relevant and helpful for the chain analysis. Overlays can be represented by N =: Number of firms or V = Volume of product.

STEP 8 Collect data from secondary sources, key informant interviews and/or surveys to verify the map.

STEP 9 Draw a final map and write a narrative explanation of the conditions in the chain. The list of parameters above may provide an outline for this.

Figure 3, developed for the cashew value chain in the United Republic of Tanzania, shows a possible result of chain mapping. It depicts actors and their functions, includes information on the number of actors and quantity of products where available, and distinguishes between two marketing channels, domestic and international markets. It separates the functions from the top to the bottom as value is added, while the support functions are depicted on the right hand side.

Figure 3: Chain Map of the Cashew Value Chain in Tanzania



Source: Masawe and Hartwich (2011). The Cashew Value Chain in Tanzania: A Diagnostic. 3ADI Reports, UNIDO, Vienna

In general, analysts should be encouraged to find their own creative solution to the graphic representation and there is no need for strict guidelines. However, here are some recommendations to avoid getting lost in the process:

- Accept that the map is a simplification of reality, and it will never be perfect. There will always be elements to improve and adjustments should be made as needed, but there comes a time to let it go and come back after future analysis.
- Accept that there may be more than one map. People have different ways of simplifying and often the maps are drawn with a different purpose in mind.
- Balance the need to generalize with the aim of presenting a picture in great detail.
- Fit the chain on one page. If more detail is required, certain parts can be enlarged and put on separate pages.
- Be aware that the map is a static snapshot; it can change rapidly as actors enter and drop out, new end-markets arise and new functions develop. A two year-old map may not be good enough to represent the current situation.
- Use the map as an opportunity to communicate with many stakeholders about its real shape. Developing a common understanding will be helpful at later stages of chain development. However, don't force it to reach a consensus.
- The map is often not sufficient for locating bottlenecks and defining development interventions. Further diagnostics are required, as indicated in Part 3.

Resources for further reading

- FIAS -Foreign Investment Advisory Service (2007). Moving toward Competitiveness: A Value-Chain Approach. IFC, World Bank Group. Available atwww.ifc.org
- GTZ (2007). Value Links Module 2: Analyzing Value Chains. Available at http://www.value-links.de/manual
- Herr, M. and T. Muzira (2009). Value Chain Development for Decent Work: A Guide for Private Sector Initiatives, Governments and Development Organizations. Chapter 3. Value Chain Mapping: Understanding Relationships. International Labour Office, Geneva, 2009.
- M4P (2008). Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value chain Analysis, Version 3. Tool 2 Mapping the Value Chain. Making Markets Work Better for the Poor (M4P) Project, UK, Department for International Development (DFID). Agricultural Development International: Phnom Penh, Cambodia. Available atwww.valuechains4poor.org
- USAID (no date). Value Chain Mapping Process. Micro Links Wiki, USAID. Available athttp://apps.develebridge.net/amap/index.php

Part 3: Diagnosing the Chain

In this part the aim is to extend the basic understanding obtained from mapping the chain (part 2) through a more in-depth analysis of important aspects of the value chain, grouped in seven diagnostic dimensions: 1) sourcing and logistics, 2) production capacity and technology, 3) end-markets and trade, 4) governance and linkages, 5) sustainable production and energy use, 6) value chain finance, and 7) business environment and socio-political context. The exercise in part 3 can be understood as adding five analytical layers to the map that has been drawn in part 2. Each of the layers can take the basic structure of the map and add additional information.

For each of the diagnostic dimensions a similar sequence is followed:

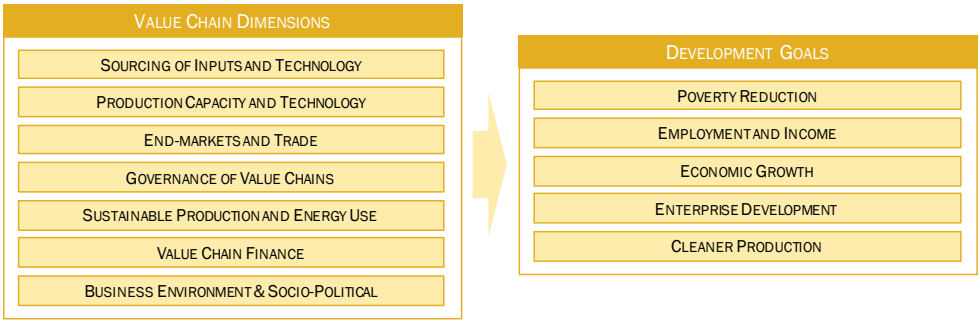
- Objectives of the diagnostics
- Guiding questions
- Useful parameters
- Analysis of development opportunities and potential impact
- Sources of data
- Resources for further reading

In the beginning of each of the sections on "useful parameters" a table is presented that summarizes the parameters of the diagnosis, the corresponding diagnostic task and a set of useful indicators.

The information gathered for each of the suggested parameters should enable the analyst to conduct three types of analyses:

- **Interpretation of the current situation** based on the status of value chain development in absolute terms and in relation to competing value chains. Preferably, the analyst will prepare a narrative on each of the parameters presenting the related qualitative and quantitative information and data gathered. The analyst could also apply a simple rating to qualify the level of development in the value chain using categories such as weak, average, and advanced level of development. The reference for such a rating can be the situation in the value chain of a neighbouring country or in another value chain in the country.
- **Identification of main development opportunities.** Next, the analyst needs to reflect on the existing possibilities to develop the value chains. By identifying parameters where the value chain is not performing well and considering both options to realistically overcome these problems and constraints and chances of success, opportunities can be identified. Another way is to think creatively about solutions and find out about best practices and competitor strategies. The idea is not that the analyst conducts a new diagnostic, but uses the information generated under the parameters defined above in a creative way to identify opportunities.
- **Reflection on possible impact scenarios.** Finally the analyst needs to work out how achieving the development opportunities identified will affect predefined development goals (see also Figure 4 below). This may not necessarily involve a new analysis based on sophisticated economic or other models, but an intuitive reflection about what may happen. Possibly a narrative description of what would happen in case of value chain development is useful here. The analyst may want to point out the hypothetical nature of this analysis, and preferably include best and worst case scenarios and reflect on chances of the development occurring.

Figure 4: Diagnostic Dimensions and Goals in Value Chain Development



This tool does not provide detailed guidance on how to report the results of the diagnostics, based on the assumption that analysts will possess the necessary skills. They may need sufficient flexibility to respond to the demands of those who commissioned the diagnostics and are most likely to use it. However, any report may need to present information on the background of the diagnostics, objectives, the methodology used (this diagnostic framework), results of the analysis, recommendations for developing the chain and expected impact of chain development interventions. The structure of the diagnostic framework presented in section 1.3 can be used as a generic outline for such a report.

Dimension 1: Sourcing of Inputs and Supplies

Inputs and supplies constitute the materials that firms use in production and processing, and can come in the form of raw materials or semi-processed goods. Well-organized sourcing of raw materials and efficient procurement of inputs, for example, can help firms reduce costs and become more competitive. If inputs are not available the production process can be negatively affected in various ways:

> ***Take note:*** *Firms in the various segments of the value chain must be able to attain inputs and supplies continuously at the right time in the right quality and quantity.*

- Delayed reception of raw materials or intermediate goods can slow down the production process and hamper timely delivery of products to clients. Missing delivery dates can cause firms to risk fines, shipment value discounts, or rejection of the shipment by the customer.
- To prevent a slow-down in the production process firms may need to hold large inventories; this is costly and ties up working capital.
- Poor sourcing practices and logistics force firms to employ a larger administrative corps, hold larger inventories for longer periods, and incur high cargo insurance costs.
- Low quality primary products can cause substantial increases in processing costs, for example to clean and purify materials.
- The quality of inputs affects a firm's ability to command a premium price in the market. To a certain extent, the quality of primary products determines the quality of the end-product.

Sourcing practices and input supply are important not only to the firms that use the supplies, but those who provide them. For example, producers of primary agricultural products can improve product quality, increase production and raise profitability if they maintain transparent and reliable contractual relationships with buyers.

Objectives of the Diagnostics

The aim of this section is to guide the analyst in assessing the availability and quality of inputs and supplies required in a value chain, the nature of the existing buyer-supplier relationships, and the status of transport and logistics that allow efficient sourcing of these inputs and supplies.

Useful Parameters

Figure 5: Roadmap to Diagnose Sourcing of Inputs and Supplies in Value Chains

PARAMETERS	DIAGNOSTIC TASKS	INDICATORS
1.1 Primary product characteristics	Describe the most important primary products and inputs used in the value chain.	▪ Categorization of primary products and inputs used ▪ Value of product and the degree of sophistication ▪ Perishablity, bulkiness and handling required ▪ Quantity required ▪ Quality specifications ▪ Options for substitution of inputs
1.2 Characteristics of primary producers and input providers	Characterize the main primary producers and input providers in the value chain.	▪ Number of suppliers, globally and average per manufacturer ▪ Clients of suppliers ▪ Attitude towards business ▪ Level of development of supply industry
1.3 Contractual arrangements	Assess the contractual relationships between buyers and supplier and the degree to which these facilitate the flow of products through the chain.	▪ Length of agreement ▪ Delivery and payment conditions ▪ Quality control measures ▪ Degree of contract formalization ▪ Opportunities for enforcement of contractual obligations ▪ Non-financial and financial services provided ▪ Existence of subcontracting ▪ Scope for changes
1.4 Logistics	Describe how inputs and supplies get to the place of manufacturing. Assess the organizational and physical transactions used in this.	▪ Delivery time ▪ Gap between lead time and process time ▪ Time needed for administrative procedures ▪ Frequency of transactions ▪ Transportation cost relative to sales ▪ Quantity of inputs to be transported ▪ Frequency of delayed delivery ▪ Difference between lead time and process time ▪ Value of loss as a percent of delivery value
1.5 Infrastructure and transport facilities	Analyze the available infrastructure to transport inputs and supplies and existing bureaucratic constraints.	▪ Road lengths ▪ Number of airports ▪ Cost per mile/km for different means and modes of transport ▪ Trucking charges ($/km ton) ▪ Shipment inspections
1.6 Communication	Ascertain the nature of communication between buyers and suppliers and the degree to which it contributes to trust and stable business relationships.	▪ Trust and transparency in buyer-supplier relationships as per opinion survey ▪ Usual means of communication ▪ Frequency of personal contact

Guiding Questions

- What are the characteristics of the primary products used in the value chain in terms of quality, quantity, price and availability?
- Who are the primary producers and input providers? How are they organized? What support do they receive? Under what contractual conditions do they sell?
- What logistical activities are required to source inputs and supplies in the value chain? How do firms manage logistics and what is the quality of logistics services that independent agents provide? What are the frequency and the quality of interactions between buyers and suppliers?
- In what way does the state of physical infrastructure, particularly roads, transport facilities, and trans-shipment points, impede the sourcing of products?
- What are the common practices of communication and information exchange with suppliers and to what extent does trust exist in supplier relationships?

1.1 **Primary product characteristics:** Depending on the nature of the end-product and the location of the firm, primary products, raw materials and supplies can differ in terms of size, perishability, handling specifications, quantity required and quality. The nature of the primary product can determine the ordering procedures and supplier relationships. One may need to distinguish between simple, e.g., raw materials such as iron ore, and sophisticated inputs, such as a machine. Providers of sophisticated inputs, say, suppliers of machinery, may include servicing and assistance in the sale of the product. If the inputs are bulkier or perishable, sourcing logistics are usually more sophisticated and the costs of transportation higher.

For the diagnostics it is suggested that the most important primary products and inputs used in the value chain be characterised. A rough categorization that can be useful to this end is presented in Box 2. The analyst should further consider the value and degree of sophistication of the inputs and supplies used in the value chain, as well as their perishability, bulkiness and handling requirements. The analyst may then want to make a rough estimate of the quantity of inputs required and specify the most important quality criteria for buyers, as well as the suppliers' problems in complying with them. Finally, options and risks for substituting certain inputs may be discussed.

Box 2: Categorizing Primary Products - the GOLF Model

Primary products that serve as inputs in manufacturing processes can be distinguished according to four main categories, which describe their origin:

Government products	Originate from mines, state-run companies, etc.
Ordinary products	Available everywhere from many suppliers.
Local products	Specify types of actors and allocate them under the different functions. Use types of actors rather than individual firms. Some actors can cover more than one function.
Foreign products	Put in arrows representing the flow of products from one actor to the next and include information on the type of contractual arrangements.

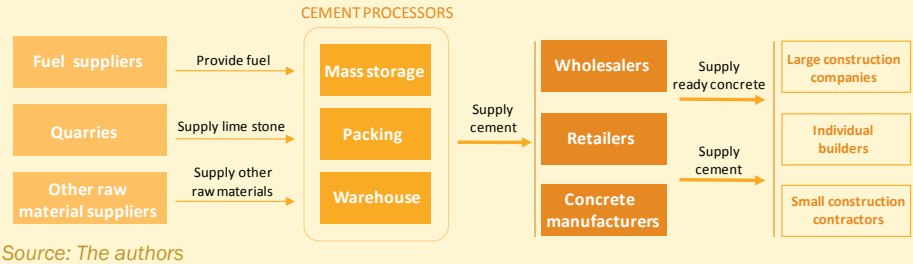
Source: The authors

1.2 **Primary producers and input suppliers:** These determine, to a large extent, the availability and quality of inputs and supplies. Supplier capacity, as well as their attitude and reliability, are important parameters in the performance of the value chain and it is crucial to have information on existing providers and their potential to deliver inputs of certain specifications, quality and quantity. Depending on their position in the market of inputs and supplies, suppliers can exercise market power. Primary producers of certain machines, for example, can have monopoly positions, whereas in raw material production polypolistic market structures (with many buyers and many suppliers) often prevail.

A brief characterisation of the main primary producers and input suppliers is suggested for the diagnostics. This would include information on their number, production and trading capacity, their business attitudes and the main clients. Useful indicators include: the number of suppliers per manufacturer, the number of clients per supplier, their attitude towards business, and the level of development in the supply industry. Depending on the structure of the industry (see example in Box 3), relations with suppliers can also depend on the power firms exercise in the value chain.

Box 3: Characterizing Supplier Relationships in the Indian Cement Value Chain

The supply structure in the Indian cement value chain is largely polypolistic, with an abundance of fuel providers, quarries, and other raw materials suppliers available. However, at the level of the cement factories there are few firms who can exercise bargaining power vis-à-vis their suppliers and the buyers of cement. In consequence, cement factories have limited pressure to reduce costs. Furthermore, the contracts between cement factories and suppliers are characterized by the low price policy of the factories, leaving little room to improve the quality of supplies. This, in turn, negatively affects the quality of the main product of the value chain, cement. The figure below illustrates the various steps of supplier relationships in the value chain.



Source: The authors

1.3 **Contractual arrangements:** Contractual arrangements for inputs and supplies are important because they assure the availability of materials for production and determine the size of inventory that needs to be kept. A study of the prevalent terms and conditions of supply contracts leads to a better understanding of the conditions and risks under which firms operate in relationship with their suppliers.

Often the types of contractual relationships in value chains of developing countries appear, on the surface, to be simple, with quantity and price fixed *ad hoc*. It is also common practice to have a blanket contract agreement (not adaptable to changes in markets and the business environment) with suppliers for a certain period of time, e.g., a year. However, after deeper examination of contracting procedures the analyst may discover that supplier contracts come

with many subsidiary arrangements based on trust or distrust, aimed at reducing risk for one or the other party.

For the diagnostics it is suggested that a brief characterisation be made of the main contractual relationships existing between buyers and suppliers. Useful indicators here include: length of agreements, degree of product specification, flexibility in the contract (scope for changes), conditions of delivery and payment, and degree of formalization. The type of supplier contract prevailing in the value chain can be identified on the basis of these indicators. Some common types of contracts (written or verbal) are summarized in Box 4. The analyst should bear in mind that it may be necessary to analyse supplier contracts not only at the level of suppliers of primary materials, but also for the other segments in the chain.

Box 4: Types of Supplier Contracts

Contractual arrangements can come in different forms with respect to compliance and the potential follow-up actions that can be put in place in case of non-compliance. In many developing countries, for example, it is only with great difficulty that non-compliance is sanctioned; mostly the aggrieved party will fail to obtain compensation. To a certain extent, the compliance regime also depends on the degree of formality that applies to relationships in the prevalent business environment. Most contracts for supplies of agricultural commodities in developing countries are verbal, with no written documentation and few opportunities to legally enforce the contract.

Type of contract	Contractual Arrangement	Example
Wholesale price contract	Stipulates a fixed unit price that the buyer pays to the supplier.	Generic
Quantity discount contract	The buyer pays a unit price that decreases according to the quantity bought.	Supermarkets
Rebate contract	The unit price falls if the quantity of product purchased surpasses a certain threshold level.	Construction material wholesaling
Buy-back contract	The supplier charges the buyer per unit purchased, but buys back (at a discounted price) or compensates for unutilized units at the end of the season.	Garment retailing
Quantity flexibility contract	The buyer provides a forecast on orders over a certain period. If these are less than forecast the buyer may need to pay a proportional fine.	Automotive industry
Revenue sharing contract:	The buyer pays per unit purchased and gives the supplier a percentage of the revenue.	Movie rental business
Options	The buyer buys products in advance or buys rights to purchase more (call option) or return (put option) products later. Options are bought at an option price and executed at an execution price.	Commodity trading

Source: The authors

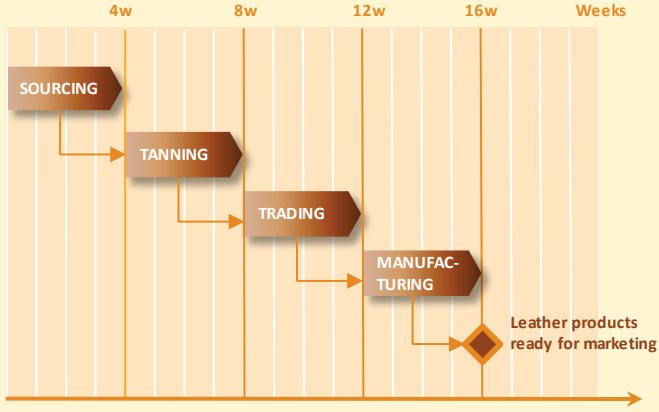
1.4 Logistics: Logistics involves managing interactions with input providers and optimal organization of transport and use of supplies. Logistics can provide value to buyers and sellers by making a product available for purchase at the right time (time utility) at the right place (place utility). There are systems where logistics functions are integrated in one firm and others where they are outsourced. Firms

are able to reduce costs if they reduce the inventory they need to hold as well as the "lead time" they require. The lead time is defined as the time from the initiation of any process of production until its completion. It depends on the number of actors involved in producing and delivering the inputs but also on the organization of transport. Just-in-time delivery, for example, is a concept that tries to diminish stockholding at firms, focusing on optimized administrative procedures, customs relationships, and technical control processes.

The diagnostics should help to understand the quality and frequency of transactions that bring inputs and supplies physically from their origin to the place of manufacturing. Useful indicators include: delivery time, gap between lead time and net time for production, time needed for administrative procedures, frequency of transactions, transportation costs (relative to sales), quantity of inputs to be transported, and frequency of delayed delivery. Box 5illustrates typical lead times for processes in the leather value chain in Africa.

Box 5: Lead Time in Leather Processing

Typically, segments in the leather processing chain include 1) sourcing of hides and skins;2) tanning and finishing of leather (with different processes for wet blue leather, crust leather and finished leather); 3) trading of the finished leather; 4) manufacturing of leather products; and 5) marketing. Usually tanning and manufacturing are conducted by different firms but there are also cases of vertical integration in the chain. Each of the processes can take about 4 weeks, for a lead time of around 4 months, from sourcing of primary materials (hides and skins) to sale of final leather products to end-buyers.



Source: Jakov Buljan (2007). Benchmarking in the Tanning Industry. 16th Session of the Leather and Leather Products Industry Panel at Gramado, Rio Grande do Sul. UNIDO, Vienna

1.5 **Infrastructure and transport facilities:** The costs of transportation, delays that can occur therein, and value lost during transportation are critical factors in supply chain management. Air transport is usually more expensive than over land, which in turn is usually more expensive than by water. For example, the cost of delivering textiles by road from Coimbatore (production region) to Delhi (retail region) is 4400 Rupees per tonne. For the same delivery, the cost of coastal shipping is 4200 Rupees per tonne. Transportation costs usually decrease with the size of the good transported (economies of scale) and distance over which they are moved (economies of distance). Given rudimentary and badly maintained

infrastructure, inefficient management of the transportation fleet, and lack of competition, transportation costs in developing countries are often considerable and the transport time required may be significant.

Countries establish customs controls for the purposes of revenue generation, economic development, and national security. Local taxation clearance and inspection procedures at the checking points may cause additional delays. There may also be legal certification and import licensing procedures that extend lead times. These factors affect the time and cost of transportation and the need for storage and inventory. Port and customs clearance processes can create bottlenecks that impede the availability of inputs and supplies for industries. Some value chains benefit from existing transport channels used by another value chain. For example, when Kenya set up its cut-flower industry it was able to use cargo space in flights that are mainly used for the tourism industry. Others have to set up their own transportation system, which can constitute a substantial, sometimes insurmountable, barrier of entry.

Box 6: Indicators for Diagnosing Infrastructure and Transportation

Unit transportation costs	The total costs of shipping a unit of supplies to the manufacturer. They are usually calculated as an average of costs required for transporting goods, for example, the costs of transporting a tonne of construction material from the port to a certain location up-country. Transportation costs include expenditures for loading and unloading and the costs of any damages and losses that may occur during transport, or alternatively for insurance. It also includes costs of packing if necessary for moving the freight (not for storing or selling it). Per unit transportation costs depend on the weight, size and fragility of the products.
Transportation cost mix	The transport costs for all supplies required to manufacture a product unit. A textile manufacturer could source yarn from China, colorants from Germany and packing material from India. A transportation cost mix could then be calculated for one t-shirt as the costs of transporting all of the primary materials.
Transport capacity	The existing weight or volume of the load that can be carried by means of transport under given conditions. This can refer to the capacity of a company, a transport operator, or a whole transport channel, e.g., a road or a water channel.
Rail and road access	The extent to which a firm can be reached via road or rail. It also refers to the quality and conditions of rail and road infrastructure.
Border/port clearance time	The time required to get goods cleared through the border or the port (from arrival of the good at customs point until its release). Clearance procedures include customs clearance (see below) but also the physical loading and unloading of supplies and paying of storage fees and taxes.
Customs clearance time	The time required to get goods cleared through customs (from arrival of the good at customs point until its release). Customs clearance procedures include the processing of import, export, and transit declarations; the classification of goods and the evaluation of their origin and value; the collection and processing of duties and fees; the physical inspection and release of goods and the administration of waivers and exemption schemes.

Source: The authors

In order to understand the degree to which infrastructure and transport facilities influence input and supplies sourcing the analyst can consider indicators such as unit transportation costs (domestic and from main supplier markets abroad), transport capacity, rail and road access, and customs clearance time (see Box 6). However, the analyst should put some limits to collecting information on transport

capacity and costs of sourcing. For example, in the automotive industry the analyst may not want to go all the way upstream to sourcing of iron ore and steel, but start calculating transportation costs from steel plate suppliers onwards.

1.6 **Information exchange and trust:** The flow of information about the quality and availability of supplies in the value chain is crucial because it enables firms to plan in advance. The development of both contracts and credit arrangements depends on the flow of such information between suppliers and buyers. Apart from existing legal arrangements, it is the frequent exchange of information that creates trust and transparency in buyer-supplier relationships in the value chain. Trust is particularly important in informal buyer-supplier relationships where sanctioning and enforcement is difficult.

Indicators that describe information exchange and trust in supplier relationships include qualitative ranking of trust and transparency, the specification of communication methods and means used, and frequency of communication. Information gathering for these indicators is usually done via surveys of buyers and suppliers, not just with respect to accurate delivery (quality, quantity and time) but business practices in general. To assess the level of trust in a value chain analysts can also make use of a trust matrix (see Box 7).

Box 7: Trust Matrix Example

A trust matrix is a table in which the trust relationships between each type of actor/segment in the value chain is rated, e.g., on a scale from -3 (no trust) to +3 (high trust). It is usually developed on the basis of qualitative interviews with representatives of all actors in the chain. It also helps to identify whether perceptions about trust are reciprocal between actor groups and within the groups (diagonal).

	Fibre Producers	Spinning Firms	Weaving & Knitting Firms	Dyeing & Finishing Firms	Garment Connectionists
Fibre Producers	1	3	2	1	0
Spinning Firms	2	0	3	1	1
Weaving & Knitting Firms	1	3	2	2	1
Dyeing & Finishing Firms	1	0	2	1	3
Garment Connectionists	-1	1	1	2	-2

Sources: Based on Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis. Making Markets Work Better for the Poor. Available from www.markets4poor.org

DCED (2008). Supporting Business Environment Reforms: Practical Guidance for Development Agencies. Donor Committee for Enterprise Development. Available from www.Business-Environment.org

OSCE (2006). Best-Practice Guide for a Positive Business and Investment Climate. Org. for Security and Cooperation in Europe. Vienna, Austria. Available from www.osce.org/eea/19768

Analysis of Development Opportunities and Potential Impact

Issues that could be explored in seeking development opportunities related to sourcing of inputs and supplies could include how to reach out to suppliers more effectively and how to better make use of existing transport facilities. The former might involve improvements in the contractual relationships with suppliers, or setting up buying

schemes and transport systems to help producers improve the availability and delivery of their products. Existing transport facilities can be optimized through, for example, better organization (e.g., two daily deliveries instead of one); by upgrading existing facilities and using new, more efficient, means of transport; proactive communication with transporters and suppliers or setting up stable contractual arrangements with suppliers.

Potential impacts from improvements in the input provision and supply situation result from being able to maintain lower stock and reduce costs, while gains through better organization ultimately allow firms to improve their competitive position in the market place.

Sources of Data

Analysts typically gather data on sourcing of inputs and supplies in the field by interviewing manufacturers, suppliers and traders as well as providers of logistical, transport and infrastructure services. In particular, analysts can collect information from the firms' transport departments, procurement offices and warehouses and, if available, from independent providers of such services. In addition, national statistics may be available on the existing road, rail and water infrastructure and the transport fleets that are operated on them. There may also be inventories of sources of supplies and existing suppliers of equipment and primary materials. Other information sources include reports and policy documents produced by governments, development agencies and consulting firms that identify existing transport infrastructure, as well as challenges and potential for improvement. By gathering such information descriptive statistics can be compiled based on transport costs and actors involved, along with qualitative information on information exchange and trust. Methods such as stakeholder consultation workshops and key informant interviews are useful in understanding the concerns of value chain actors about the type of relationship they maintain with suppliers. General information on transport infrastructure may also be available from Internet resources such as www.scdigest.com, www.bharatbook.comand the United Nations Logistics Base at www.unlb.org. The United Nations Joint Logistics Centre (UNJLC) manages information on logistical capabilities across countries.

Resources for further reading

- Bowersox D.; D. J. Bowersox, D. J. Closs, D. Closs, M. B. Cooper (2009). Supply Chain Logistics Management. McGraw-Hill/Irwin.
- Harrison A., and R. van Hoek (2010). Logistics Management and Strategy: Competing Through the Supply Chain. Pearson Education, Limited.
- New Zealand Business Council for Sustainable Development (2003). Business Guide to a Sustainable Supply Chain: A Practical Guide. Available from www.nzbcsd.org.nz/supplychain

Dimension 2: Production Capacity and Technology

Firms require production capacities and need to make use of appropriate production technology if they want to participate effectively in value chains and benefit from value addition. Production capacity and use of technology can constitute important barriers of entry for firms to enter value chains. They are also of concern to firms that aim at technological upgrading, seeking to innovate and improve their position in the market place. Ultimately production capacity and technologies deployed in the value chain determine the characteristics of the end-products it generates.

Take note: *Changing markets and availability of new knowledge and technology force firms in the value chain to rapidly adapt and improve production. A sound understanding of the existing production capacity, the use of technologies and the necessity to innovate are important elements of value chain diagnostics.*

Production capacity is determined by the physical installations, machines and equipment available in the production process, as well as knowledge and know-how among the people engaged in production. The use of technology determines how well and how efficiently firms are able to produce. Certain production processes require a minimum size to become efficient, as when special machines are to be used or benefits from economies of scale to be realized. Technology can be embodied in machines and equipment, in which case it can be easily acquired, whereas knowledge and technological know-how depends on the firms' workers and their ability to learn. Technology should not be understood only as the results from high-tech research and development; it can also include traditional and low-tech processes that are often developed and innovated by users based on experience.

Objectives of the Diagnostics

The aim of this section is to help the analyst understand the value chain's existing and potential production capacity and the type of technologies that firms use in production and, on this basis, make judgments about the competitiveness of the chain and opportunities for extending capacities and technological upgrading.

Guiding Questions

- What is the current capacity of firms in the various segments of the value chain to produce, and how are they endowed in terms of human resources, machinery, facilities and other resources? In what way do these capacities affect the level of production, transformation and processing?
- What type of processing and transformation technology is currently used by principal companies in the industry? What is the effectiveness and efficiency of this technology?
- What technical, local and other knowledge is being used in the value chain? Who has access to knowledge and who provides knowledge? How is knowledge being shared and jointly developed?
- How do the technologies used in the value chain compare with best practices in the country, the region and in other parts of the world?
- What options are available to innovate, extend or adjust production capacities and technologies in the value chain, and what opportunities exist for technological upgrading and product development?

Useful Parameters

Figure 6: Roadmap to Diagnose Production Capacity and Technology in Value Chains

PARAMETERS	DIAGNOSTIC TASKS	INDICATORS
2.1 Production capacity	Analyse and categorize firms as to their existing and utilized production and processing capacity	▪ Output of different segments of the chain (per annum) ▪ Product quality ▪ Capacity utilization ▪ Inventory rates ▪ Throughput and its bottlenecks ▪ Cycle time
2.2 Technology	Depict the technologies used in the chain and evaluate their appropriateness in view of chain development	▪ Source of technology ▪ Productivity (output per unit of land/labour/capital) ▪ Reliability ▪ Cost of technology ▪ Level of sophistication ▪ Cost reduction potential of new machinery
2.3 Knowledge use	Describe the nature and type of knowledge being used in the chain and the mechanisms for its further development and diffusion	▪ Nature and type of knowledge being used ▪ Variance of knowledge being used in the chain ▪ Share of foreign technology ▪ Share in exports to developed countries ▪ Business and support facilities ▪ Practices of knowledge sharing ▪ Information and communication technologies used to share technical knowledge
2.4 Costs and margins	Analyse average costs and margins for various production and processing activities in the value chain	▪ Direct and indirect costs of production ▪ Profit margins
2.5 Innovation	Describe level of innovativeness of firms in the chain and rate need to innovate	▪ Main innovations recently developed and/or adopted. Current standards prevalent in the market ▪ Research and development facilities ▪ Existence of better technology ▪ Costs of introducing new technology

2.1 **Production (or productive) capacity:** The capacity of firms in the value chain relates to their endowment of physical installations, machines, equipment and space for production and their ability to extend those in the short run. Production capacity is also reflected in the quality of the final product and the time that is required to finish this product. An interesting aspect also is to find out if the existing production capacities are utilized and if they are sufficient given current and future opportunities with regard to supplies and demands.

In the diagnostics, the task is to evaluate existing production capacities of firms across the value chain, where it may be necessary to distinguish between different steps of transformation. For example, in the wood processing sector one might distinguish between primary wood processing at sawmills and

secondary processing, such as furniture production; different capacities can exist for each. A number of methods are available to analyse production capacity:

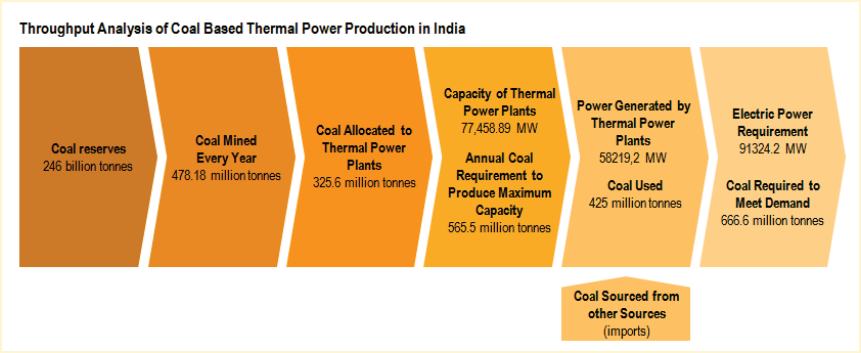
- Description of firms and their capacities with regard to size of plants, number of employees and quantity of output produced. Production capacity can be estimated from product outputs in recent peak years.
- Quantification of "Capacity utilization," which is the extent to which firms utilize their installed productive capacity. The "capacity utilization rate" or "operating rate" can be calculated as the ratio of actual output to the maximum amount of output that can be produced with the existing stock of capital. One could apply this measure to the sum of all firms in the value chain.
- Inventory ratios, e.g., inventory value in relation to sales value, are useful measures providing information on how much working capital is tied up in inventory.
- "Throughput analysis" calculates how many products are currently "channelled through" to the end-markets and in what way existing capacity matches current or future demand. Here it is important to understand the structure of the flow of products. For example, there may be five primary producers and five processors in the chain. The overall quantity produced is the quantity that is processed; however, the difference between each producer delivering to only one processor and each producer delivering to all of the processors can be significant and should enter into the analysis.

  Part of the information required may already be available from the mapping exercise (see part 2). However, throughput analysis goes further by identifying bottlenecks in flows of product through the chain. Inventory build-up, for example, indicates such a bottleneck. Finally throughput analysis aims at identifying opportunities to maximize throughput (see example in Box 8).
- "Cycle time analysis" measures the total length a production activity needs to complete its cycle. It reflects the amount of time that an input to an industrial manufacturing activity (or a set of activities) requires to be transformed to an output (lead time refers to a set of subsequent activities). The main part of the analysis is the decomposition of the activities into different phases. The cycle time thus calculated is a measure of the effectiveness of the existing facilities of production. Cycle time of similar processes in other industries or of world class organizations from the same industry can be used as benchmarks. Cycle time analysis helps to identify opportunities for process improvement in value streams, using time as a core measure. Applying cycle time analysis in a value chain one would estimate the time that various actors in the chain need to complete their production and processing cycles.

Box 8: Measuring Production Capacity By Means of Throughput Analysis

The figure below depicts the results of throughput analysis of the coal-based thermal power industry in India, leading to the following observations.

1. The power generated from coal is not enough to meet the requirements of the country. The gap is filled from other sources like nuclear power and hydro-electric power.
2. There are sufficient coal deposits, but not enough coal is being mined. This may indicate the importance of developing additional mining capacities and infrastructure.
3. The capacity of the coal-based thermal power plants is not sufficient to satisfy the country's electricity demands. Other sources exist, but the gap here highlights the need for these sources other than coal.
4. The installed capacity of coal-based thermal power plants is not being maximized due to the lack of coal.



Source: The authors

2.2 Technology Use: The use of technology affects both the characteristics of the end-product and the costs of the production process. A product can be technology-intensive, meaning it is produced with the help of many technological devices, or it can be basic using less sophisticated methods of production. Firms continuously need to balance costs and benefits of introducing new and more sophisticated technology in production. Application technology that is not sufficiently developed and tested can become costly. However, remaining with inefficient and outdated technology is not an alternative when competitors enter the market.

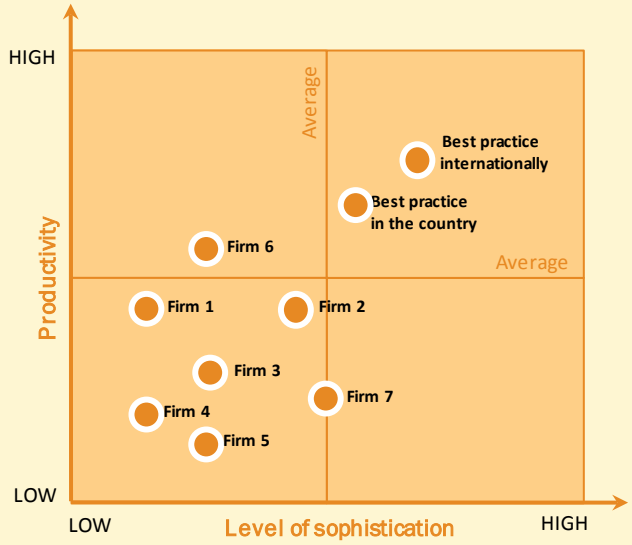
The diagnostics should provide an overview of the origin of the technologies being used in the value chain. The analyst may further describe in general terms how the technology operates, as well as its productivity and reliability, and identify the costs of the technology in terms of capital investments. All this information will lead to an assessment of how appropriate these technologies are in view of opportunities for development of the chain, and if there are opportunities to invest in new machinery and technology.

However, the suggestion for this diagnostic is to limit analysis to an overview of the status of the technology, without entering into technical details. The idea is that non-specialists will still be able to understand. Useful indicators for a description of technologies include, for example, the nature of the technology, its level of sophistication, its source, affordability, suitability, accessibility, reliability and interchangeability (the level to which alternative technical solutions are available). One can also use indirect evidence for technology use,

for example investments in machinery and technology, cost reduction realized or productivity increase. Box 9 presents a simple approach to visualize two aspects of technology use in a value chain in comparison with a best practice situation.

Box 9: Positioning Technology Use in a Value Chain

The diagram below depicts the diversity of technologies used in a value chain taking into account the dimensions of sophistication (e.g., the use of modern, capital-intensive technology) and productivity (e.g., measured through output per hour). The analyst will need to find out where in the diagram the firms in the value chain are to be positioned. The use of sophisticated technology does not mean that this is improving the efficiency of a production process. However, if a company is efficient at a certain level of sophistication, with further sophistication it may realize existing potentials to become even more efficient. Once the best practice situation has been identified for the country it can also be compared with best practices that are found in competing value chains at the global level. However, firms in the value chain may be fine as long as the level of effectiveness is high enough. Eventually they may even wait a bit more in order to invest in cutting edge technology with higher effectiveness. The diagram can of course also be used to show other dimensions of technology use such as cost per unit, reliability, output per labourer, capital intensity, etc.



Source: The authors

2.3 Knowledge use: Knowledge its creation and its distribution, can be a main factor driving the development of the value chain. The knowledge intensity in a production process depends on the complexity of the transformation process and the sophistication of the end-product. Knowledge and business techniques applied in the production process can come from the users themselves, but also from specialists, consultants and suppliers of technology and machinery. Sometimes it is also buyers who transfer knowledge to suppliers to assure compliance with required product qualities and sometimes helping suppliers to increase production and productivity. Clusters of firms that engage in similar

transformation processes in a geographically limited area are often characterized through intensive knowledge exchange and innovation.

Mostly, knowledge builds from practice and use over many years and turns into tacit knowledge, which is ability and know-how that cannot be learned from books or replaced through automated processes. In this sense knowledge internal to the firm can contribute as much to competitiveness as external knowledge. In certain sectors, there are also public agencies with the mandate to strengthen capacities and disseminate knowledge to certain less developed actors, e.g., small and medium-sized firms or farmers.

The aim of the diagnostics is to describe the nature of knowledge that the various actors may possess and to identify who invests in it, who provides it, who uses it and who disseminates it. The analyst may distinguish between the acquisition, the storage, the dissemination and the application of knowledge. Certainly, the measurement of knowledge is difficult and therefore is usually dealt with in a qualitative and indirect manner. Useful questions that can be asked to describe knowledge use in a value chain are depicted in Box 10.

Box 10: Indicators of Knowledge Use

- What type of knowledge is used in the various production and transformation processes in the value chain?
- How great are the discrepancies and variance in the use of knowledge across actors in the chain (from artisanal to sophisticated)?
- What is the share of foreign technology being used in the value chain?
- How high is the percentage of share in exports to developed countries?
- What is the availability and quality of business support and extension services?
- What are common practices of sharing knowledge?
- Which types of new information and communication technologies are applied to share knowledge in the chain?

2.4 **Costs and Margins:** The analyst should consider calculating some sort of financial measures for the most important businesses in the value chain. Net income margin is one of the many useful indicators derived from financial analysis, as presented in Box 11. When calculating the margins, distinction is usually made between variable and fixed costs. Other important financial measures are cash flow, break-even point, and internal rate of return. No introduction to those concepts is provided here as these are readily available from many books and training materials. However, unlike individual enterprise analysis, the focus here is on typical (average) costs, margins and other measures of certain businesses in the value chain that use different types of technologies (e.g., highly efficient but capital-intensive technology versus less efficient, labour-intensive technology).

Box 11: Calculation of Net Income Margins in Cashew Processing

Per 1000 kg	*Average for firms using Italian technology*	*Average for firms using Indian technology*
Revenues	**2124**	**1470**
Quantity of processed cashew nuts (different grades)	1770	1400
Average Price	1.2	1.05
Variable Costs	**-1495**	**-1249**
Purchase of 1000 kg raw cashew nuts	-900	-900
Materials (cooking oil, powder, etc.)	-15	-25
General utilities (water, electricity, etc.)	-500	-55
Marketing costs	-40	-10
Human resources costs	-40	
Grading of raw nuts		-6
Boiling and cooling		-5
Shelling of raw nuts		-98
Drying		-20
Peeling		-50
Grading of kernels		-10
Roasting		-20
Packaging		-50
Fixed Costs	**-550**	**-50**
Depreciation and maintenance costs	-300	-50
Storage operation costs	-50	
Fixed labour	-200	
Net Margin in USD	**79**	**171**

Source: The authors, based on estimates

2.5 **Innovation:** Innovation can be understood as anything new that gets successfully applied in a productive process. Innovation is a prerequisite for sustained competitiveness in the value chain. It can typically relate to technical as well as organizational aspects. It also can extend to issues of management and marketing; however, in this dimension the focus rests on innovations in production. The occurrence of technical innovations, in fact, builds the basis for technological competitiveness. Innovations can be brought to firms in the form of "embodied" knowledge; for instance, a machine may have a lot of innovative features that allow for more productive use. They also can come in the form of knowledge that allows improving processes. For firms to use innovations they need innovative capabilities, meaning they need people who can use new tools and machines or engage in new processes. The availability of these capabilities among staff is often a bottleneck to development in many developing country value chains. Innovation also depends on support from public and national and

international science and research institutions, as well as corporate research and development (R&D) units. “Upgrading” can be seen as a process of gradual innovation in the value chain.

The aim in the diagnostics should be to describe the level to which actors in the value chain develop and are able to use innovations. The analyst should try to understand which sources provide knowledge and technology, and how it is transformed, applied, reworked, tested and finally put into use. Helpful questions that can be asked to be able to describe knowledge being used include:

- What main innovations have been recently developed and/or adopted in the value chain?
- What is the size and quality of research and development facilities and activities that contribute to innovations in the value chain?
- Are there technological innovations available on the market that could be applied in and adapted to processes in the value chain?
- What are the costs incurred in introducing new technology, including the costs for the equipment, training of staff, redundancy of old equipment, etc.

Furthermore, it may be important to classify how important innovation is in relation to other strategies of development in the value chain (see Box 12). If innovation is a relevant strategy the analyst may engage in a more detailed analysis of the above. A useful tool to describe innovations are “innovation histories,” narratives that explain where technologies are from, who introduced technological innovation, who developed them further, how they build the basis for competence and competitiveness in the chain, and how they were eventually overthrown by new innovation from in and outside the chain.

Box 12: Strategies of Value Chain Development

Adopting Porter’s model on the three stages of economic development in a firm one can argue that a value chain or a segment in a value chain can apply three main strategies for development. It can try to reduce the costs of inputs, it can intensify the investment (in equipment and know-how) or it can try to develop innovations. Which strategy is the more important one depends on the level of development of the chain and its competitors.

Source: Based on Porter, 1990

Analysis of Development Opportunities and Potential Impact

An overarching concept that can help in the interpretation of the development opportunities with regard to production capacity and technology is “productivity”. One can make judgments about the productivity of firms in the various segments in the value chain, individually as well as in comparison with one another and with firms in

other chains or countries, and reflect on what would need to be done to improve productivity. This reflection should be carried further to options for extending capacities and upgrading technology, all which of would also require investments mostly difficult to realize. Especially for those industries that do not depend on local sources of knowledge, technological upgrading and innovation can become very costly. The analyst may reflect on how realistic it is for firms to engage in upgrading of productive capacities and use of new technology.

Benchmarking is a method to compare any kind of performance of a firm or a value chain with leading competitors in and outside the geographic area of coverage. It helps to detect performance gaps and identify the main constraints to competitiveness. The focus here is on benchmarking performance related to the parameters mentioned above: productive capacity, technology use, knowledge use, costs and margins and innovation. Benchmarking a value chain in relation to another constitutes substantial work with regard to the definition of suitable benchmark parameters and the collection of data (see Box 13 for an example of a benchmarking study). The diagnostic challenge lies in analyzing relative performance, but relative to whom? One can compare against historic performance, performance of firms doing very similar things, performance of firms in the same sector but in other processes, or performance of firms in other sectors, but with similar processes. Preferably, in cases where data can be made available, benchmarking is best undertaken with firms producing like products.

Box 13: Benchmarking Cigar Making in the Caribbean

The table below provides results from a benchmarking exercise in which cigar making in Cuba (market leader) is compared with cigar making in the Dominican Republic. In this particular case, eight critical performance indicators were identified by the analysts as driving competitiveness in the global cigar industry. Some of these factors, such as sales volume and research and development capacity, apply to other industry sectors also, while other factors, such as flavour and the availability of specialized packaging, are specific drivers of these particular value chains.

Critical Success Factors	Dominican Cigars	Cuban Cigars
Sales Volume	120 million sold	80 million sold
Flavour	#2 in blind taste tests	#1 in blind taste tests
Packaging	Imported wrapper	Local wrapper
Research and Development Capacity	Weak (but improving)	Strong
Distribution Channels	Mostly sells to Davidoff, etc.	Controls European distribution channels
Final Market	Over-reliance on US embargo of Cuba	Strong European penetration
Industry Management	Dynamic firms	State-owned firms
Marketing	Rising image as a "cigar country"	Strong "Cuban" brand

Source: World Bank (2009). Clusters For Competitiveness: A Practical Guide & Policy Implications for Developing Cluster Initiatives, International Trade Department, The World Bank, Washington, D.C.

Technological advances may also have negative impacts on certain groups of the society who risk being sidelined by technological progress, and negative effects can result with regard to employment and environmental sustainability. For example, unskilled labourers may not see much additional income from the introduction of new technologies. On the other hand, technological progress often forms an important ingredient in systemic competitiveness, which results in sustainable employment and value creation along the entire chain. However, these effects may only materialize in the long run and not necessarily apply to all types of value chains. In any case, it is important that when analyzing the opportunities for technological upgrading, emphasis also be put on all possible positive and negative effects. In the end, however, it is difficult to judge the net effect of a technological advancement on poverty reduction, employment and income and economic growth, as well as firm development and cleaner production.

Sources of Data

Information on technology use and productivity is not easy to get and can best be retrieved from leading producers, knowledgeable technicians and engineers in technical departments, and factory managers. Interviews with the users of technologies, such as labourers and maintenance personnel, can also be useful. Some aspects of production capacity can be extracted from national statistics and industry surveys. Ultimately production capacity and the use of technology can show up in indicators such as labour productivity, increased production, sales, revenues, lead time and safer production. These figures are often available in the annual reports of companies. Data on cycle time and throughput can often be collected conveniently from interviews with lead firm managers. It is also useful to interview procurement and sourcing departments, along with customer relationship units, to find out how technical knowledge is passing through the chain.

Resources for further reading

- M4P (2008) Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis. Part 4 – Tool 6 Analyzing Costs and Margins. Available from www.valuechains4poor.org
- UNIDO (2003). Investment Project Preparation and Appraisal (IIPA) Teaching Materials. Module 3: Technical Analysis. United Nations Industrial Development Organization (UNIDO), Vienna, Austria.
- UNIDO (2008). Agro-Value Chain Analysis and Development: The UNIDO Approach. United Nations Industrial Development Organization (UNIDO), Vienna, Austria. Available from www.unido.org

Dimension 3: End-Markets and Trade

The end-market is the place where the products of the value chain will be sold without further transformation. Products can be sold to traders, wholesalers and retailers or directly to the consumers. Ultimately it is the consumer who decides which products get purchased. Firms in the value chain need to consider end-market demands, not only to determine how best to sell products, but also to understand the nature and quality of the products that they will be able to sell in the future. In addition, firms in a value chain must consider the barriers that can prevent them from entering markets and selling their products. Such trade barriers include trade regulations, standards and export restrictions, as well as the market power of competitors.

Take note: *Today, markets change fast and competition is everywhere. If firms want to benefit from value addition and stay in business they must ensure their products and services reach end-markets and meet standards as well as end-buyer and consumer demands. Value chain diagnostics must provide information on consumer preferences, and standards and regulations, along with existing and potential opportunities to market products.*

In this section the analyst will find guidance for study that leads to a better understanding of the situation of the end-market of value chain products as well as existing rules and standards and restrictions to trade. The aim here is not to conduct a market study or to develop a marketing strategy. Rather, the diagnostics should lead to a description of market conditions and opportunities that firms have to access end-markets. The diagnostics should also look at alternative market segments and the type of standards that must be complied with.

Objectives of the Diagnostics

The aim of this section is to guide the analyst in assessing end-market conditions that determine production in the value chain and in studying market access limitations and trade barriers within the chain.

Guiding Questions

- What are the main characteristics of the end-products of the value chain?
- Which kind of products do consumers request, and what are their preferences with regard to quality and other product characteristics?
- Which agents engage in marketing the products to consumers? What are the perspectives of these buyers vis-à-vis consumer preferences and end-market developments?
- What are the common practices and capacities in product marketing and trade? What market exploration strategies and trade schemes do firms apply (past and present)?
- Which firms and countries do value chain actors need to compete with? How competitive are they in comparison?
- What are common standard-setting and metrology practices and skills?

Useful Parameters

Figure 7: Roadmap to Diagnose Markets and Trade in Value Chains		
PARAMETERS	**DIAGNOSTIC TASKS**	**INDICATORS**
3.1 End-product characteristics	Describe and categorize products and product lines of the value chain	▪ Product category according to UNSD ▪ Product value ▪ Degree of transformation ▪ Technological sophistication ▪ User friendliness ▪ Duration and perishablity
3.2 Consumer demand	Specify the nature of consumer demands and assess if existing products correspond to existing and future demands	▪ Consumer segment serviced ▪ Quantity of products sold to certain types of consumers (also change over time) ▪ Market share and market growth rates of products in the chain ▪ Purchasing power in the various consumer segments ▪ Needs and preferences in consumer segments
3.3 End-buyer perspectives	Identify important end-buyers in the chain. Survey their perception on consumer demands and on the chain's capacity to respond	▪ Number and type of end-buyers involved ▪ Perception on new trends and product development ▪ Perception on existing capacities, skills and product quality
3.4 Marketing and trade capacities	Identify agents involved in marketing and trade. Identify marketing practices and strategies as well as existing capacities. Describe strengths and weakness of the value chain products in comparison with other countries and value chains	▪ Number and type of agents involved in marketing and trade ▪ Marketing budget estimates ▪ Organization of (commodity) trade ▪ Existing marketing strategies ▪ Competitors
3.5 Standards	Describe standards used in the value chain. Determine capacity to comply with local and international standards.	▪ Standards relevant in the value chain ▪ Percentage of firms applying mandatory and voluntary standards successfully ▪ Capacity of certification and metrology institutions to apply standard compliance systems

3.1 **End-product characteristics:** Any diagnostics of end-markets and trade conditions should start with a categorization and description of the value chain's end-products and/or product lines. End-products are those products not further transformed. A product line is a group of products that are closely related, either because of similar characteristics or because of similar processes engaged in their production. Identifying end-product characteristics helps to understand not only the nature of the value added generated in the chain, but also how and where its products can be sold.

Main categories used by the United Nations Statistics Division (UNSD) to characterize industrial products for reporting on international economic activities are shown in Box 14. Additional characteristics of the end-product include the value of the product (ranging from low to high), the degree of transformation, its user-friendliness, the degree to which the product embodies sophisticated technology, and its duration (the frequency with which the consumer replaces the product) and perishability (tendency to spoil and decay).

Box 14: Main Product Categories According to the UNSD

0 - Agriculture, forestry and fishery products

1 - Ores and minerals; electricity, gas and water

2 - Food products, beverages and tobacco; textiles, apparel and leather products

3 - Other transportable goods, except metal products, machinery and equipment

4 - Metal products, machinery and equipment

5 - Construction services

6 - Distributive trade services; lodging; food and beverage serving services; transport services; and utilities distribution services

7 - Financial and related services; real estate services; and rental and leasing services

8 - Business and production services

9 - Community, social and personal services

Further subcategories are available from the United Nations Statistics Division (UNSD) website at http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=16

3.2 **Consumer demand:** A value chain diagnostic needs to take into account the demand for products that the chain generates. This demand depends on the type of end-product consumers, their purchasing power, and their needs and preferences with regard to quality, image and other product characteristics. As demand can fluctuate, it is also important to monitor changes in price and volume in end-markets. A situation of particular concern is when firms work towards a hypothetical market and it is not clear if buyers will purchase value added products in the form and quantity in which they are produced.

Assessing consumer demands for value chain products can be a difficult task requiring not only time and resources but also creative research. To keep the efforts within a certain limit, for the diagnostics it is suggested that analysts draw from interviews with end-buyers as well as from available studies on consumer behaviour and market statistics. The analyst is also free to interview consumers, of course, though doing this in a systematic way may quickly overstretch the scope of this rapid diagnostic.

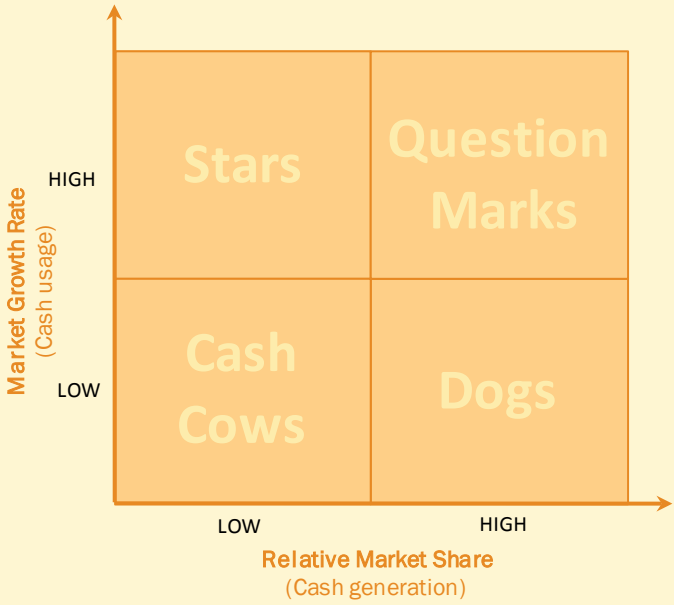
The first step in the analysis of consumer demands should be the description of the consumer segments serviced by the value chain. Consumer segmentation is the process of classifying consumers into groups that have some set of similar characteristics. The most basic method is to segment by simple demographic indicators such as age, income, or marital status. The analyst may then proceed further with the quantification of products that are sold to those segments, an

assessment of their purchasing power, and a qualitative analysis of their needs and preferences. If no studies are available, most of this information can be found with end-buyers such as traders, marketers or exporters.

Finally, the analyst may take all this information and work towards an interpretation as to whether the given products correspond to existing market demands. Comparison of the market share and market growth rates of the products of the value chain can be useful for this (see Box 15).

Box 15: Positioning Value Chain Products in Product Life Cycle

In order to identify production portfolios the Boston Consulting Group developed a scheme that can also help to identify strategies for value chain development in the context of given market conditions. For that purpose the analyst puts the products of the value chain in a matrix with the dimensions "market growth rate" and "relative market share". According to the position of the product there are certain strategies to follow. "Stars" should be promoted so they keep shining. "Question marks" should be closely observed and, if possible, promoted. "Cash cows" should be left for continuous income generation without further promotion or investments. Finally, "dogs" should be taken out of the market. If the value chain has only products in the categories of "cash cows" and "dogs" serious efforts need to be undertaken to develop new and improved products.



Source: Boston Consulting Group 1968, see
http://www.bcg.com/about_bcg/history/history_1968.aspx

3.3 End-buyer perspectives: Most businesses in the value chain do not interact directly with the end-consumers of their products. Often there are a range of intermediaries, exporters, importers, wholesale distributors, retailers, service providers and brokers involved in marketing and trade. In other cases large manufacturers may deal with retailers directly but rarely with consumers. End-buyers are not consumers but sell to them. It is useful to include in the diagnostics the perspectives of end-market buyers, meaning the agents who channel the products to the end-consumer. End-buyers are familiar with the demands of the consumers and they translate these demands to the downstream firms in the chain. This can also include the passing on of information about trends and opportunities for product development as well as perceptions about existing capacities and skills in production, marketing, and logistics, or about the quality of the product. Often they have a much better overview of the consumer demands in general rather than individual consumers. Consequently, it is often even more efficient to refer to the interpretations of end-buyers about existing and potential demands than conducting direct consumer surveys.

3.4 Marketing and trade capacities: In each value chain, firms—whether individually or in association—pursue strategies to market their products. Firms depend on their own capacities in marketing and trade, on support from marketing export promotion bodies, and on private agents engaged in marketing and trade.

Box 16: Parameters to Identify a Marketing Strategy

Based on the above elements, firms may follow various strategies with regard to:

a) **Dominance in marketing**: For example, a company could decide to be a leader, a challenger, a follower or a nicher in its marketing of a product
b) **Innovation**: A company could try to become a pioneer, an early follower or a late follower, or a conservative latecomer, or
c) **Growth strategy**: A company could integrate horizontally, integrate vertically, diversify or intensify.

Source: The authors

Value chain diagnostics must look at the existing marketing and trading practices and the capacities of firms and agents therein. The starting point of the analysis should be the identification of traders and their engagement in marketing.

Furthermore, the analyst may want to find out if and how commodity trade is organized, for example, whether commodity associations or governmental agencies supervise the application of commodity grades and standards. The next point in the analysis should be to identify any marketing strategies and trading schemes that firms apply in the value chain. These can differ substantially in some value chains; whereas in others they are similar across firms (see Box 16).

Finally, in order to understand the position of the value chain and its firms in the market, one also needs to look at competitors. Understanding competitors' strengths and weaknesses is important to understand the value chains current situation and opportunities for future development. The intensity of competition depends on the market in which the business operates; there may be many small rival businesses, a few large rival firms or rapidly changing markets where both small and large competitors enter. A common method for structuring this part of the diagnostics is to compare the situation in the value chain with those of main competitors. Parameters often used here are product costs, product quality, flexibility to react to changing demands and additional services for consumers (see Box 17 for an example).

Box 17: Competitors Analysis for Afghan Bran Production

USAID compared options for the Afghan bran value chain to enter the Indian market in comparison to some key competitors such as Indian bran, bran from the U.S., and from Iran. Main results of the analysis are shown in the table below.

	Afghanistan	India	United States	Iran
Cost	Qualifying	Winning	Winning	Winning
Quality	Winning	Qualifying	Qualifying	Winning
Flexibility	Winning	Qualifying	Qualifying	Qualifying
Service	Qualifying	Winning	Winning	Qualifying
Summary	Afghanistan currently wins with high quality based on natural bran and a wide range of DFN. Transport & logistics difficulties drive up costs and make timely delivery difficult.	India wins by keeping costs (and quality) low while providing their limited range of products to wholesalers where and when it is needed.	The second largest exporter of bran in the world, economies of scale and excellent logistics systems allow the US industry to reliably and inexpensively deliver a narrow range of generic goods globally.	Iran grows some but not nearly all the products that Afghanistan has to offer the market. Commercial farming methods and sea access to the Indian market give the Iranians a cost advantage while delivering a nearly identical product.

Source: USAID Micro Links Wiki - Phase 2 Tools: Competitors. Available from apps.develebridge.net/amap/index.php/Phase_2_Tools:_Competitors

3.5 Standards: Standards are means to define and regulate main characteristics of products and the way these are produced. As such, standards help to solve problems of information asymmetry, providing all actors in the chain and in particular consumers with information about products and the process of making them. Standards can refer to aspects of product quality but also to social and environmental issues related to their production. A distinction is often made between process standards, in which characteristics of the production process are specified, and product standards, where the focus is on product characteristics and quality. Common denominators in codes of conduct in production (often imposed by buyers) relate to the prevention of child labour, forced labour, non-discrimination, minimum wages and maximum working hours. There are also mandatory standards, which are set by governments in form of regulations, and voluntary standards, set by key players in the value chain but with which other agents in the chain need not need comply. An overview of some commonly applied international standards is provided in Box 18.

For value chain diagnostics it is important to position the value chain in its capacity to comply with standards. Therefore the analyst may first identify the type of standards that are currently applied in the value chain and used by different actors. In addition, the analyst wants to evaluate the capacity of companies and the whole chain to implement the standards as well as the capacity of institutes that verify standards, e.g., with regard to quality control and certification and accreditation. Metrology laboratories, for example, are places where measurement and calibration work is performed with regard to the application of technical standards.

Box 18: Common Standards Used in Industrial Value Chains

International Organization of Standardization	Many standards, such as quality assurance systems like ISO 9000, environmental management systems like ISO 14000, and food safety like ISO 22000
Accountability International (SAI)	SA 8000 for social accountability
International Labour Organization (ILO)	Social standards with an emphasis on “decent work”
Codex Alimentarius Commission (CAC),	Food safety standards
World Organization for Animal Health (OIE)	Animal health standards
International Electrotechnical Commission (IEC)	Standards for electrical, electronic and related technologies

The international standards listed above become mandatory if translated into national legislation (or supranational legislation as in the case of the EU). Meanwhile the private sector may decide to set up its own standards in order to comply with consumer preferences and improve public image. Private standards are often developed in collaboration with consumer organizations and NGOs representing public concerns. One example for a private standard is the European Retailer Produce Working Group on Good Agricultural Practices (EurepGAP), representing a group of leading food retailers in Europe with a market share of around 60%. EurepGAP and its newer version GlobalGAP established process and product standards for fresh fruits, vegetables, potatoes, green coffee, livestock, aquaculture, flowers and ornamentals regulating agricultural production.

Analysis of Development Opportunities and Potential Impact

The development of the value chain depends in large part on the existing market opportunities and the capacity that actors develop, individually and jointly, to respond to such. However, many value chain development efforts assume that meeting such demands is easy, underestimating the challenge to change production, transformation, and support services so that demands can be met. Value chain development is also about feeding market demand criteria, gradually, into the design of production and supply strategies and the entire organization of the chain. Often it is difficult to start meeting demands in high-value markets in Europe and North America where there are substantial barriers of entry and investment costs; a more gradual upgrading of responses to demands of consumers in domestic and regional markets may be adequate here. There are also markets such as for food staples (e.g. wheat) or low-value convenience goods (e.g. tooth brushes), where the adjustment of processes and products alone will not yield much benefit. Entering and persisting in these markets often requires extending economies of scale and applying low-wage strategies.

Sources of Data

Collecting information on end-markets and trade conditions may include drawing from value chain and market research studies as well as interactions with end-market buyers such as exporters and retailers, heads of sales departments of major firms, representatives of industry and export associations, consumer research agencies, and experts in licensing and standards. Each of these agents may have relevant information regarding end-market conditions; for example, an exporter may know more about different end-buyers across a number of buyer countries whereas a retailer may be more familiar with national consumer demands and emerging trends.

Only when substantial time and financial resources are available one should consider conducting consumer surveys. Otherwise the analyst should rely on key informants in market and trade and on the available literature and reports on markets, consumer demands and trade conditions. Some useful data collection methods include surveys, in-depth interviews and observations.

Sources for further reading

- X Action for Enterprise (2007). Value Chain Program Design: Promoting Market-Based Solutions for MSME and Industry Competitiveness. Available from www.actionforenterprise.org
- X GTZ (2007). Value Links Module 9: Introducing Social, Ecological and Product Quality Standards. Available from www.value-links.de
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- X Joss, S., H. Schaltenbrand, and P. Schmidt (2006). Clients first! A Rapid Market Appraisal Toolkit. Theoretical background and experiences from various Rapid Market Appraisal (RMA) Events. Helvetas, Switzerland. Available from www.helvetas.ch
- X UNIDO (2003). Investment Project Preparation and Appraisal (IIPA) Teaching Materials - Module 2: Market Analysis and Marketing. United Nations Industrial Development Organization (UNIDO), Vienna, Austria.
- X UNIDO, CBI, NORAD (2010). Making Private Standards Work for You: A guide to private standards in the garments, footwear and furniture sectors. United Nations Industrial Development Organization, Vienna, Austria. Available from www.unido.org/privatestandards

Dimension 4: Governance of Value Chains

Value chains come with a certain degree of coordination. Formally independent firms link to each other in a network and/or cluster-like structure to find a way to exchange products and knowledge so as to be competitive. The only exception to this need for group coordination occurs when all activities are contained within a single firm; other than that, firms that are part of a value chain will need some sort of coordination or "chain governance". In essence, chain governance refers to the organization of actors in the value chain making it possible to bring a product from primary production to end-use. Governance is also about power and the ability of certain firms to exert control along the chain.

Take note: *Understanding power relationships and coordination mechanisms among chain actors is important to identify strategies for improved chain governance that can lead to upgrading and more viable and competitive value chains.*

This part of the diagnostics focuses on the power that buyers and suppliers exercise in the value chain, the coordination mechanisms that enable transactions and the flow of knowledge in the chain, and the nature and quality of the relationships firms maintain among themselves and with service providers and regulatory institutions.

Objectives of the Diagnostics

The aim of this section is to help the analyst identify dominant actors, coordination mechanisms and type of governance in the value chain using a limited set of parameters. Through this the analyst will have information at hand to reason about opportunities for skills development and upgrading of certain firms under the prevalent governance regime in the value chain. The analyst will also be able to consider improvements in the current type of governance-- improvements that firms can only realize collectively, usually upon the initiative of a lead firm, and at times with support from government and development agencies.

Guiding Questions

- Which are the dominant/lead firms in the value chain? Which of those are local and which operate internationally/globally?
- Do lead firms play a role in coordinating the value chain? To what extent do they influence production and the use of standards?
- To what extent are firms from developing countries engaged in high value added activities, and to what extent is value addition monopolized by dominant/lead firms?
- What type of governance is prevalent in the value chain? Is the governance type based on market, network, quasi-hierarchy or hierarchy arrangements?
- What opportunities exist for upgrading and improved chain governance and what could be the possible impacts of these?

Useful Parameters

Figure 8: Roadmap to Diagnose Governance in Value Chains		
PARAMETERS	**DIAGNOSTIC TASKS**	**INDICATORS**
4.1 Actor domination	Identify the lead firms in the selected value chain	▪ Size and market share of main firms in the value chain ▪ Core competences of main firms ▪ Linkages between main firms and suppliers
4.2 Participation in and distribution of value added	Determine position of selected firms in the value chain and their contribution / remuneration	▪ Percentage of final price that is contributed by the selected firms ▪ Comparison with percentages contributed by other actors in the value chain
4.3 Cluster concentration	Identify the existence of clusters in the different segments of the value chain and rate their degree of development	▪ Number of geographically concentrated firms in a segment of the value chain ▪ Interactions between those firms ▪ Stage of development of cluster
4.4 Type of governance	Determine prevalent type of governance in value chain	▪ Market dependence ▪ Sales concentration ▪ Knowledge asymmetry ▪ Price setting ability ▪ Product/service specificity

4.1. Actor domination: Firms of a certain size and market share can influence the conditions under which business partners in the value chain operate. For example, such lead firms can set product specifications for suppliers, even detailed product blueprints prescribing the production process and the application of certain technological, environmental or labour standards, and how much is to be produced, including scheduling and logistics. The dominant actor could be an end-buyer or retailer in which case one would talk about a buyer-driven value chain. In other cases, a manufacturer or a supplier of primary materials "drives" the value chain, making it a supplier-driven value chain. However, there are also value chains where many firms operate in parallel and no dominant player exists.

Identifying dominant actors and whether they are buyers or suppliers is a first step in the diagnostics of value chain governance. Certain industries such as footwear, garments, fashion, and toys are commonly dominated by buyers, including wholesalers, distributors, or branded retailers. In these industries most value added is generated where buyers are closely linked to end-markets and have direct relationships with distributors and brand-building companies. In other industries the chain is dominated by firms capable of integrating several strands of technology into one product (airplanes, cars, ships), so their power comes from the superiority in advanced manufacturing and integration capabilities. Finally, there are processing industries where lead firms can be either branders or the large processors who developed their own distribution and marketing networks. Box 19provides questions the analyst wants to ask when identifying dominant actors.

Box 19: Identification of Value Chain Dominance

- Which are the largest firms in this industry?
- Are they foreign or national?
- What is their share of the market?
- What are they good at? (branding, distribution, manufacturing, research and development; mention all that apply)
- Do they hire/work with other firms in the locality/country or do they source from foreign suppliers?
- Do they set rules and standards (formal and/or informal) for their local suppliers?

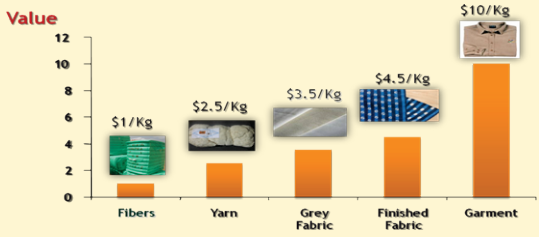
4.2. Participation in value added activities: Some activities in the value chain may be better remunerated than others. Value addition may be high on the level of secondary processing while primary production and processing is less lucrative. In some industries, such as apparel, the best remunerated activity may be design, while in others it is marketing or retailing, as is the case in the food industry, for example.

In this part of the diagnostics it is important to look at the entire value chain, including—if it acts globally—the activities outside the country. In the diagnostics the analysis should study the distribution of value addition across the segments of the chain, identify where most significant parts of value addition occur, and ask why this is so. Box 20provides some guidance for the analyst to explore the issue.

Box 20: Investigating Who in the Chain Benefits Most from Value Addition

Start with the key question: What percentage of the final price of a product corresponds to manufacturing, processing of the raw materials, distribution, marketing/branding and any other activity in the value chain? To answer this, the analyst can collect information on per unit prices (i.e. gross output values) at the different stages in the chain. Second, total input and operations costs per unit must be subtracted from the per unit prices. Such information can help the analyst to make judgements about which value chain activities are better remunerated and which are not. This would require also bearing in mind the costs and risks of each activity. The analyst may also identify which firms are represented in the lower-remunerated ranks and which are in the top-remunerated ones. Eventually, lead firms tend to keep higher remunerated activities and outsource the less well-remunerated ones to developing country producers.

The graph below illustrates distribution of net revenue from one kilogram of cotton across all value chain actors, from fibre making to garment making. It shows that over half of the value of the end-product is captured by garment manufacturers.



Source: Gherzi Research (2005). Value Chain Analysis and Strategy Outline for the Textile and Garment Industry. UNIDO, Vienna, Austria.

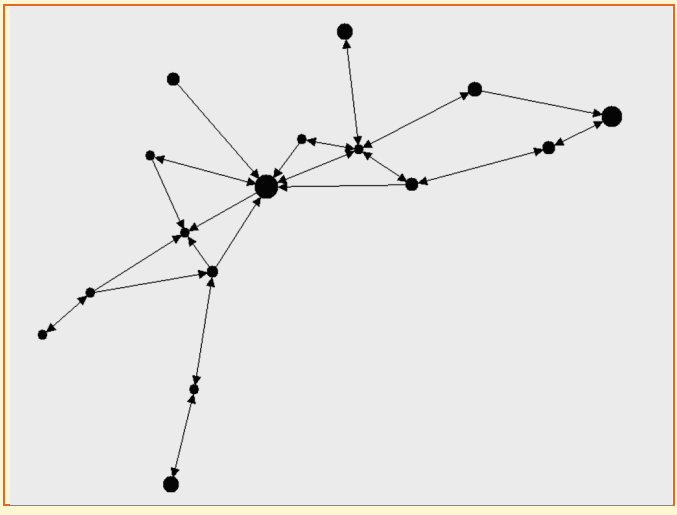
4.3. Cluster concentration: Certain segments in the value chain may form clusters, meaning geographical concentrations of interconnected firms and associated support services. Clusters are often home to extensive exchange of information and technology while their members profit from a common pool of resources, skilled labourers and support services. The development of a cluster segment in a value chain usually requires distinct measures that relate to capacity strengthening of a large number of actors and networking. It is therefore important to know if a cluster exists and to what degree it is developed. Basically one can distinguish four stages of cluster development:

- *Existing stage:* clusters with significant presence articulated through the presence of substantial linkages and exchange of information/technology.
- *Declining stage:* existing clusters that are declining rather than expanding,
- *Emerging stage:* clusters that appear to be gaining a significant presence but have not yet achieved a critical mass,
- *Potential stage:* clusters that might emerge in response to given trends or policy/development stimulation.

How can the analyst find out about the existence of a cluster? One quick way is to count the number of firms in a segment of the chain, find out if they are concentrated in one geographical region and determine whether they exchange information and draw from similar resources and services. The actors and their interactions can be visualized, for example by drawing simple network maps (Box 21).

Box 21: Map of a Cluster of Wine Producers in Colline Pisane, Chile

The nodes in the graph below show wine producers in the region of Colline Pisane in Chile. The level of technology producers use is denoted by the size of the nodes, with more advanced producers having a bigger node. The arrows depict the existence of a relationship, such as information exchange. The connectedness between the producers suggests the existence of a cluster.



Source: Giuliani, E. (2006). The Selective Nature of Knowledge Networks in Clusters: Evidence from the Wine Industry. Journal of Economic Geography

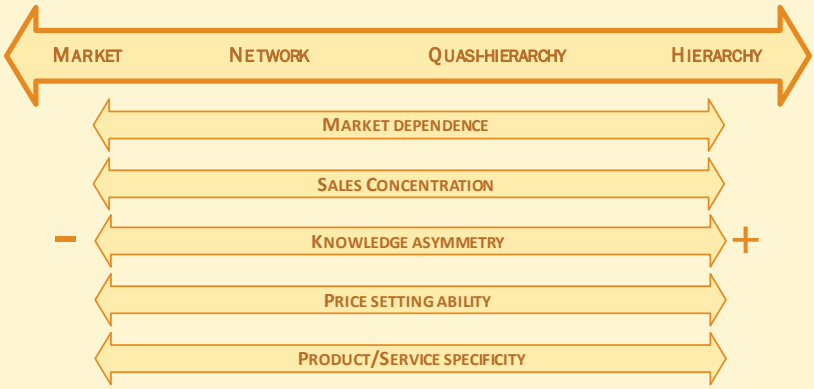
4.4. Type of Governance: There are different types of governance, from a very loose coordination with minimal contact amongst firms to more hierarchical types of governance, where lead firms set the parameters for the products of other firms in the chain. Four main types of value chain governance can be distinguished:

- *Market*: The main point of interaction between firms in the value chain is discussion about the price at which the product is sold. Market-based chains are common when the product is fairly standard and non-differentiated (e.g., wheat in bulk or standard plain cotton t-shirts), the price is determined by supply and demand amongst many buyers and sellers (in an auction, for instance), and there is no exchange of information required between buyer and supplier to ensure that specifications are met.
- *Network*: This type of governance takes place between firms with complementary capabilities and equal say on business decisions. Firms that engage in this type of governance are equally skilled in complementary *high value added* activities. Usually firms have few alternatives other than partnering with another firm because what their partner provides (a specific design capability, knowledge of the market, a particular technology, etc.) is difficult to find elsewhere. In such arrangements, product specifications are not standard and require close and frequent communication between the firms. This type of chain governance may still be less common between firms in developing countries compared to those in developed countries.
- *Quasi-hierarchy*: Here firms (usually smaller, weaker or newer to the market) operate by following strict instructions from the lead firms. This is common between buyers from developed countries and their suppliers in developing countries. Firms from developing countries join the value chain, e.g., as suppliers of manufactured goods. In these cases, buyers often screen opportunities for low-cost manufacturing destinations, identify candidates for supplies, provide all technical specifications for the product, oversee production and decide the price that the supplier will be paid.
- *Hierarchy*: In the context of a value chain, hierarchy occurs when one firm completely dictates the business of another firm. It also can occur when a firm is fully vertically integrated and one department, for instance dealing with product marketing, dictates the activities of another department, such as product development or procurement. Hierarchies can also occur when transnational corporations work with subsidiaries in developing countries; the mother company dictates the subsidiaries' procurement, production and marketing strategies. Market and hierarchy are the extreme opposites in the chain governance continuum.

For the diagnostic the analyst's task should be to place the value chain at issue in one of the above four categories according to the governance most prevalent in the chain. Box 22 provides support for this categorization.

Box 22: Indicators for Rapid Appraisal of Chain Governance

There are five indicators that can help the analyst determine if the governance type of a value chain falls in the category of market, network, quasi-hierarchy or hierarchy.



Source: The authors, based on Humphrey and Schmitz 2000 and Bazan and Navas-Aleman, 2004.

- **Market Dependence:** If a local firm exports more than 40% of its output to one market then this could be interpreted as a sign of quasi-hierarchy. Qualitative questions that help in investigating market dependence include: How much of the production goes to the main market? Is the firm planning to start selling to other markets? What are the obstacles to selling in different markets? Why is its current market so important? Would it need to invest in modifications in order to sell to other markets? Is the firm willing to accept lower prices/tighter lead times/worse financing conditions in this market so it doesn't have to change to other markets?
- **Sales concentration:** The issue here is whether a firm is selling a high percentage of its output to a single buyer (e.g., 30% or more to a single buyer). The higher the percentage, the greater the likelihood of a quasi-hierarchical linkage between that buyer and its supplier.
- **Knowledge asymmetry:** This is linked to the distribution of knowledge in value added activities in the value chain. Knowledge about design, marketing, and branding allows international buyers to exert more influence and be more powerful than manufacturers (particularly SMEs) in developing countries. If one of the partners can substitute its current business partner with others with similar levels of knowledge then most likely this is quasi-hierarchy.
- **Price setting ability:** It is common for buyers in hierarchy and quasi-hierarchy arrangements to have more power to negotiate price reductions with their suppliers, forcing them to decrease operation costs. The suppliers are then in the weaker position because they are competing for the attention of the buyer with many other similarly able suppliers. Questions the analyst may ask with regard to price setting include: Who decides the price of the product? How much has it changed over the last X years? Is there any room for negotiation for the price? What would happen if the firm refuses to lower its price? Would it lose this buyer? Will its neighbours/competitors get the buyer? Has the firm ever been able to increase its prices with this buyer?
- **Product specificity:** A product can be anything from basic, bulk and homogenous (such as wheat grain) to unique, differentiated, and specific (furniture designed to fit into an individual house). The more specific the features of a product are the more information needs to be exchanged between supplier and buyer to make sure demands are met in response to the possibilities of production. The buyer may want to ensure the quality of the product. The buyer will make fewer efforts in cases where the product is less specific (for example, when buying wheat the buyer can rely on grading standards), and make more efforts when the product becomes more specific (monitoring whether the furniture design fits the demand is more work-intensive).

Source: The authors, based on Humphrey and Schmitz, 2000; Gereffi et al, 2005 and Bazan and Navas-Aleman, 2004. (see full reference at the end of chapter)

Based on the parameters presented in Box 22, the figure 9 below provides an overview of the main characteristics of the four categories of chain governance:

Figure 9: Categories of Chain Governance			
MARKET	**NETWORK**	**QUASI-HIERARCHY**	**HIERARCHY**
'Arm's length' relations between firms.	Coordination of activities due to mutual interdependence.	One firm is subordinated to another	Vertical integration within a firm – ownership of one firm (or parts of it) by another.
Indicators: - Lowest market dependence - No sales concentration - Knowledge asymmetry non-existent or nor an issue - Price set by the market - Commodities or standard products	Indicators: - Medium to high market dependence - Medium to high sales concentration - Low knowledge asymmetry - Price set by consensus - Complex products	Indicators: - High market dependence - High sales concentration - High knowledge asymmetry - One firm sets the prices for the other - High product/service specificity but weaker firm can be easily replaced	Indicators: - Highest market dependence - Highest sales concentration - Knowledge asymmetry varies - Highest price setting ability - Highest product specificity
Source: The authors, based on Humphrey and Schmitz, 2000; Gereffi et al, 2005 and Bazan and Navas-Aleman, 2004.			

Analysis of Development Opportunities and Potential Impact

Leading the discussion from the type of governance in the value chain towards development opportunities, the analyst must consider various types of upgrading. In fact, different types of governance are associated with the development of different types of skills by firms in developing countries. The different types of skills that may be developed by firms entering value chains are often grouped into three categories (process, product and functional). The process of acquiring these skills is known as 'upgrading'. There are three main types of upgrading which constitute valuable strategies for developing country SMEs to compete in the domestic and global economies (see Box 23).

The analyst may also consider engaging lead firms as a strategy for value chain development. In fact, donors and technical assistance agencies have partnered with many lead firms in global value chains that source products from developing country suppliers while passing on knowledge and technology to help them upgrade. This has led, at times, to overcome barriers of entry creating more favourable conditions for the participation of small and medium-sized firms in developing countries. However, lead firms may not always be willing to participate in these initiatives, in which case it is better to work with firms of lesser size and influence. Eventually, there may also be opportunities to create demonstration effects that encourage competitors to follow.

Box 23: Types of Upgrading in Value Chains

PROCESS UPGRADING	PRODUCT UPGRADING	FUNCTIONAL UPGRADING
Doing certain tasks better Indicators: ▪ Investment in machinery ▪ Work force training ▪ Changing layout ▪ New management techniques ▪ Introduction of total quality programmes ▪ Socially and environmentally sound practices	Making a product that is of **better quality**, more sophisticated or simply carries a better price without engaging in new activities within the chain. Indicators: ▪ New models ▪ New lines ▪ Higher prices	Acquiring skills in a chain activity **that the firm did not possess before**. Indicators: ▪ For instance, a manufacturer starting to design its own products ▪ An ODM producer launching own brands ▪ An assembler that starts producing whole products ▪ A manufacturer develops its own chain of shops ▪ Starting to carry out R&D

Source: The authors, based on Humphrey and Schmitz, 2000; Gereffi et al, 2005 and Bazan and Navas-Aleman, 2004.

Harnessing opportunities for development interventions in market-led value chains may be particularly challenging given the atomized nature of linkages in these chains. Any effort of value chain development would need to work with several firms at different points of the value chain simultaneously. Such interventions often have a clearer link to poverty effects than the more indirect approach of engaging lead firms with their single-focused business objectives. However, multiple-point interventions require higher levels of coordination than interventions where the lead firm is the main funnel for action.

Quasi-hierarchical chain governance has been associated with fast upgrading of suppliers in the area of manufacturing (usually poorly remunerated in comparison with other activities in the value chain). This is consistent with the specialisation of global buyers in other areas such as marketing, supply chain management and branding. However, if the majority of firms from developing countries content themselves with operating at the lower end of quasi-hierarchical value chains, they risk missing out on developing skills in higher value added activities that are usually better remunerated.

In conclusion, to bring about value chain development firms from developing countries should be supported to take advantage of the upgrading opportunities in manufacturing provided by quasi-hierarchical value chains and combine them with the upgrading opportunities in high value added activities (e.g., design, supply chain management, marketing, etc) that market-led value chains offer.

Sources of Data

Most information for this part of the diagnostics should have been made available through the analysis of dimensions 1, 2 and 3. Dimension 4 only adds an additional analytical angle. Additional information may need to be made available from general industry statistics at the country level that can provide figures about final markets, percentages exported to different markets, common sales channels (via export agents, own distributors, foreign buyer's distributors, own shops, etc.), type of products sold to different markets, number of producers, etc. Secondary data sources may also provide

information on operations in the value chain, such as figures on types of firms operating locally (producers, suppliers, associated industries, logistics operators, local buyers, export agents, etc.) and contact details of the main trade associations in the industry. Such information gained can be complemented by interviews with buyers, trade associations and suppliers to get a feeling for the power relationships in the value chain and the type of governance patterns. Sometimes it is useful to ask 'mirror questions' to both partners in buyer-supplier relationships, as they may have very different perceptions about the relationship.

Resources for further reading

- Gereffi, G., J. Humphrey, and T. Sturgeon. (2005). "The governance of global value chains." Review of International Political Economy 12(1): 78-104.
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- UNIDO (2011). Training Kit on Pro-Poor Cluster Development. United Nations Industrial Development Organization (UNIDO). Vienna, Austria. Available from www.unido.org/publications
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Dimension 5: Sustainable Production and Energy Use

In the past, industrial value chains have often developed in response to efforts to grow economically, applying new technologies that innovate and maximize output without considering adverse effects on the environment. This may not occur purposefully; resource consumption effects are often indirect and hidden. The inefficient and wasteful use of resources including raw materials, water and energy in expanding industries, compounded by the application of polluting technologies and the generation of waste and emissions contaminating soils, water and air, has become a major concern to governments, development planners, and particularly affected communities and societies. In response, larger corporate firms that are themselves polluters have started initiatives for more sustainable production. Sustainable energy use and production has become a major development goal.

Take note: The development of industrial value chains can deplete natural and other resources to a point beyond recovery. However, the value chain perspective constitutes a starting point for more sustainable production, making it possible to track the various steps involved in production and marketing of a product.

Since the mid-1990s, not least in reaction to the Rio World Summit on Sustainable Development in 1992, there has been a significant effort to engage in eco-efficiency and cleaner production activities, and multiple instruments are now at hand. Goal 7 of the Millennium Development Goals focuses explicitly on ensuring environmental sustainability. However, introducing this issue at the policy level and in the implementation of projects in the productive (industrial) sector is often insufficient. Environmental sustainability needs to cut across every aspect in the preparation of industrial development projects, including those that start from a value chain development logic. This guide suggests that chain diagnostics should include the systematic collection of information on the status of sustainable production in the value chain in all segments of the chain. Given its limited scope, value chain diagnostics cannot replace comprehensive analysis of energy and material flow, which can only be achieved through life cycle analysis and environmental impact assessment. However, chain diagnostics does permit the introduction of some degree of "life cycle thinking" into the rationale of value chain development (see Box 24). Nevertheless, the diagnostics will focus only on those parts of the life cycle that engage in production and not those that enter into household consumption.

Objectives of the Diagnostics

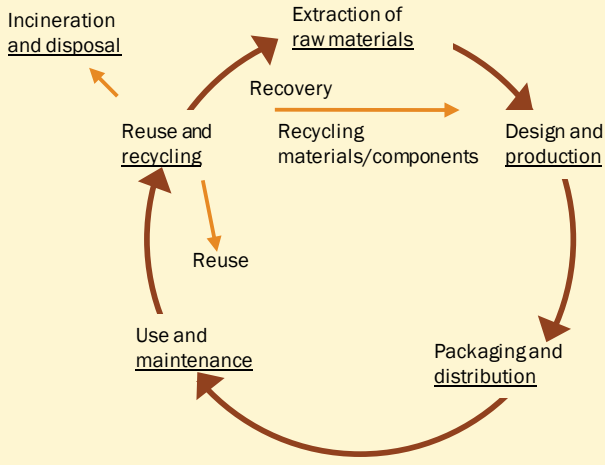
The aim of this section is to guide the analyst through a simple procedure to check the effects that the value chain and its development can have on the sustainable use of natural and other resources. It should help to check whether certain aspects along the chain that can be "hotspots" in sustainable production, meaning critical points of unsustainable or over-use of resources. Finally, the analyst should also be able to give recommendations on how sustainable use of resources can be improved.

Guiding Questions

- What types of materials are used in the value chain? Are they toxic, polluting or in any other way harmful to people and the environment?
- What type of energy is used in the various segments of the value chain? What are the sources of energy? Is the energy used efficiently? Is there potential for using less energy?
- Do the various activities in the value chain require a lot of water? Where is the water taken from? Is it sent back contaminated or non-contaminated? Are there water cleaning installations in place to reduce contamination? Are there measures to economize water use?
- Are the raw materials used in the value chain produced in such a way that biodiversity could be reduced? Is the contamination affecting the biosphere and biodiversity?
- What other kind of emissions, such as noise, smell and air pollution, are caused by activities in the value chain? Are there measures in place to keep them at a low level?
- Do the various processes in the value chain produce many side products and waste? Is this waste treated or re-used, for example, to produce energy or fertilizer?

Box 24: Introducing "Life Cycle Thinking" into Value Chain Development

Life Cycle Analysis (LCA), often called 'cradle to grave' analysis, involves a systematic understanding of resource consumption and environmental releases to air, water and soil associated with products, processes and services. In principle, a product's life cycle starts when raw materials are extracted from the Earth, followed by manufacturing, transport and use, and ends with waste management, including recycling and final disposal. At every stage of the life cycle there are emissions and consumption of resources. Applied to value chain analysis, life cycle analysis would engage in the study of the intensity of resource utilization (e.g., energy, water) and the environmental impact of outputs (e.g., by-products, waste and emissions) at each stage of the value chain, the aim being to identify opportunities for improving resource use, reducing environmental impacts and targeting parts of the life cycle where the greatest improvements can be made.



Source: UNEP 2007

Useful Parameters

Figure 10: Roadmap to Diagnose
Sustainable Production and Energy Use in Value Chains

PARAMETERS	DIAGNOSTIC TASKS	INDICATORS
5.1 Use of materials	Find out what materials are used in the value chain and how their production and use may be harmful	▪ Consumption of most important raw materials ▪ Efficiency parameters of material use ▪ Chemicals and toxins used ▪ Material-saving measures in place
5.2 Energy use	Find out how much and what type of energy is used in the value chain and if there are any energy-saving measures in place	▪ Energy consumption ▪ Sources of energy ▪ Energy-saving measures in place ▪ Use of alternative technologies
5.3 Water use	Find out how much water is used by the various groups of actors in the value chain and if there are any water-saving measures in place	▪ Water consumption ▪ Sources of water ▪ Efficiency of water use ▪ Water-saving measures in place ▪ Treatment of polluted water
5.4 Effects on biodiversity	Find out to what extent sourcing of primary products and contamination can harm biodiversity	▪ Description of main biodiversity issues
5.5 Emissions	Find out to what extent emissions in industrial processes contaminate the environment	▪ Air pollutants emitted ▪ Emission reduction measures in place
5.6 Waste management	Find out if there is a great deal of waste produced in the processes of the value chain and if the waste is treated and/or reused	▪ Description of waste management practices

5.1 **Use of materials:** A value chain uses a certain amount of materials. This does not necessarily mean that these materials are used efficiently. Often, in fact, the final product contains only a low percentage of the original raw materials and the rest is waste. Important materials include biomass (animals, feed, food and forestry), coal, construction minerals, gas, industrial minerals, oil, and ores (see Box 25 for a more detailed categorization.) Today, total global consumption of natural raw materials amounts to more than 60 billion tonnes per year. Taking into account all the materials that are extracted but not actually used to create value in economic processes (also labelled the "ecological rucksack"); this number reaches more than 100 billion tonnes. Often on the national level there is some sort of Material Flow Accounting (MFA) available. Material flow analysis may also be conducted by a lead firm across the level of the supply chain. Often the goal of such corporate material flow analyses is to optimize the production processes in such a way that materials and energy are used in the most efficient manner (e.g., by recycling and reduction of waste). However, companies also use them to respond to criteria of “corporate social responsibility”.

In a value chain, raw materials get processed and these processed materials become the inputs of subsequent transformation processes. The buyer of processed goods may choose between different types of inputs, some of which are produced in cleaner and more efficient ways than others. However, it is often difficult for buyers to know the contents of the inputs they buy and the processes with which they have been produced. In the developed world, buyers therefore request that suppliers submit material declarations. In fact, many manufacturers have developed material declaration questionnaires (also known as green procurement surveys or supply chain questionnaires) that require suppliers to disclose certain information about the products and subparts they sell. In developing countries this practice may be very much in the initial stage. It is also important to think about how raw materials and supplies are stored and transported between the different points of use and production in the value chain. Often the main contamination effect actually derives from improper transport rather than the product itself.

In the diagnostics the analyst may want to identify the most important materials used in the value chain, understand the efficiency with which they are used, find out about the damage that some toxic and dangerous substances cause to humans and the environment, and think about how materials can be saved or used more efficiently in the value chain. For that purpose data can be obtained on the main materials and inputs used in the value chain, the way they are transported, efficiency parameters for use, and toxicity of substances.

Box 25: Material Classification

BASIC MATERIALS	MANUFACTURED MATERIALS	MANUFACTURED PRODUCTS
Abiotic ▪ Ores ▪ Minerals ▪ Fossil energy Biotic ▪ Wood ▪ Cork ▪ Rubber ▪ Plant fibres ▪ Food Water Secondary ▪ Stags ▪ Ashes ▪ Gypsum	Natural Stones Concrete Mortar Composition floor Glass Paints Ceramics Textiles Insulation materials Bitumen Iron and Steel Non-ferrous metals Paper products Wood Plastics Cement Lime Rubber	Buildings ▪ Offices ▪ Houses Roads Installation equipment Bridges Electrical equipment Food products Furniture Packaging

Source: Adapted from Bringezu, Schütz and Moll (2003) Rationale for and Interpretation of Economy-Wide Materials Flow Analysis and Derived Indicators. In Journal of Industrial Ecology, Volume 7, Issue 2

5.2 **Energy use:** Oil, natural gas and coal continue to provide a significant portion of the energy used in the various phases of value chains, be it for industrial production and transportation, transport, heating, electricity, etc. However, fossil fuels emit greenhouse gases contributing to global warming, and pollute the environment in various forms. Managing greenhouse gas emissions across the value chain must therefore become a primary objective in value chain development. The main questions to be asked here are how much energy can be saved and how much can be sourced from environmentally friendly green technology, e.g., solar, wind, and others, or from by-products of the industrial process. The use of alternative energy sources and emerging technologies must be considered when the aim is to balance benefits of energy use with its impacts on the environment. Opportunities for the adoption of renewable energy in developing countries depend on energy prices and subsidies, availability, access to technologies and infrastructure, and policy limitations. Meanwhile, efficiency in the use of energy is determined by a variety of factors, including available infrastructure, energy prices, energy security, type of equipment being used, efficiency of technology, etc. One way of calculating the energy use of a company or an entire value chain is the "carbon footprint" (see Box 26).

Box 26: Introduction to the Carbon Footprint

The carbon footprint is a method that specifies all greenhouse gases (GHG) emissions caused. It is usually expressed in terms of the amount of carbon dioxide emitted or its equivalent in other GHGs. Reporting carbon footprint has become big business for firms in OECD countries trying to sell their products as "greener". There are standard carbon footprint calculations available for the production of paper, plastic, glass, cans, computers, carpets, tires, cars, airplanes and preparation of food at home or in restaurants. Eventually they have not much relevance to developing country industries where the conditions and parameters are often very different.

For the diagnostic the analyst could look into the amount of energy used in the different segments of the value chain, specify the common energy sources, ascertain the efficiency in energy use and think about opportunities for saving energy and using alternative technologies. By no means should the analyst engage in lengthy carbon footprint analysis, though if these calculations are available they could be mentioned and critically discussed. Often the analyst may simply come only to very broad conclusions, that certain sectors in the value chain are more energy-intensive, for example in relation to other segments or other value chains, and that certain opportunities to save energy and use alternative technology have not yet been exploited. There is also the whole field of carbon emission trading in response to the Kyoto Protocol. Developing country value chains, where fewer emissions occur, can in fact sell unused emission rights to developed countries. While the analyst could mention the potential for entering this niche in the future, a detailed analysis of how this system would need to be institutionalized would exceed the scope of the analysis.

5.3 **Use of water:** The world is facing an increased level of "water stress" and "water scarcity". The term 'water stress' is used when there is not enough water for agricultural, industrial or domestic needs. An area is said to experience water stress when annual per capita renewable freshwater availability is less than 1,700 cubic meters, on either an occasional or persistent basis. 'Water scarcity' is used when availability falls below 1,000 cubic meters, which usually can seriously affect economic development and human health. Current estimates indicate that by

2025 water stress will be a reality for half the world's population. This in turn will mean higher water prices reflecting scarcity, competition for water, and changing water allocations. It will also require that firms and entire value chains start to monitor and reduce their water use and impacts on society and the environment. Unlike carbon, the impacts and issues around water are local, confined to the watersheds and river basins of specific geographical locations.

For the diagnostic the analyst can look into the amount of water used in the different segments of the value chain, specify from where the water is taken, determine the efficiency with which the water is used, and think about opportunities to save water and clean polluted water. Eventually the analyst will want to adopt the perspective of a 'water footprint', which is less challenging than calculating carbon footprint (see Box 27). In many cases, however, the information required may be too difficult to obtain. Alternatively one can estimate the amount of water that is used and discuss usage efficiency and pollution.

Box 27: Introduction to the Water Footprint

The water footprint is an indicator that looks at both the direct and indirect water use of a consumer or producer. The water footprint of a business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the business. Water use is measured in terms of water volumes consumed (evaporated) and/or polluted per unit of time. A water footprint can be calculated for any well-defined group of consumers (e.g., an individual, family, village, city, province, state or nation) or producers (e.g., a public organization, private enterprise or economic sector). In gauging use one distinguishes between green, blue and grey water. The 'green' component refers to the water from rainfall, 'blue' to water from surface or groundwater and 'grey' to the volume of polluted water associated with the production of goods and services, quantified as the volume of water that is required to dilute pollutants to such an extent that the quality of the ambient water remains above agreed water quality standards. For industrial production this is the dilution of effluent quality to agreed standards, although this is complicated by the use of downstream municipal treatment plants.

Example: SAB Miller, a worldwide brewing company, estimated that at a certain period of time at its production sites in Africa 127 litres of water were required for producing 1 litre of beer. The water was used for the following steps in the production.

1% -Water for malting

4% - Water for production

7% - Water to manufacture beverage container

89% - Water to grow barley

Source: SAB Miller (2009). Water Footprinting Report. Identifying & addressing water risks in the value chain

5.4 **Effects on biodiversity:** Industrial production processes require primary materials; their extraction in the form of biomass products usually has an impact on the ecology. Processing bananas that come from large monocultures and are produced under application of chemical pesticides most probably has a different effect on the number of animal and plant species than producing honey from wild bee hives. Biodiversity can also be harmed through air and water emissions.

Generally there are no "first best" solutions available to restrict effects of industries on biodiversity as few alternatives for sourcing specific primary materials exist. However, in many cases there are opportunities to limit the

negative effects on biodiversity by operating more cautiously and applying ecologically friendlier technologies.

In the diagnostics the analyst should make sure to bring up the issue of biodiversity and find out if there were past efforts or may exist future opportunities to preserve biodiversity. For example, furniture companies can use ecologically certified wood, roads can be built around ecologically important areas and minerals can be extracted with less contaminating technologies. For data collection the analyst should discuss the issue of biodiversity with key informants. The results need not be presented in terms of figures, a qualified narrative may be sufficient. Deeper analysis of the ecological dynamics and interactions should be left to subsequent studies.

5.5 **Emissions:** This parameter refers to emissions of substances other than carbon (see 5.2) that are released into the air, including chemicals, particulate matter, and biological materials. Air pollutants as a result of industrial processes can harm or cause discomfort humans or other living organisms, or damage the natural environment. The reduction of emissions has been an important aspect of the petro-chemical industry, but also other industries engaging in animal, cement, metal, and energy production can have substantial emissions.

Without going into too much detail the analyst may want to identify the most important emissions of air pollutants in the industry and evaluate if opportunities to reduce these have already been realized or should be put in place in the future.

5.6 **Waste management:** Industrial processes usually generate by-products and waste. These need to be collected, transported, processed, detoxified, diluted, recycled or disposed of. Waste management is concerned with the organization of the disposal and recycling of waste, including the monitoring of the flow of waste and logistical planning. Waste management is also carried out to recover resources. Waste management can involve solid, liquid, or gaseous substances. Some of the available technologies for waste management are sophisticated and include gasification, burning and thermal treatment, and recycling. Another important field is the way waste is handled and transported, which in itself can be a source of contamination and energy consumption. Ultimately, the most efficient way of dealing with waste is by avoiding it.

To cover this aspect in the diagnostics the analyst can simply ask main firms how much waste they produce and how they dispose of it. They can also be asked about their strategies to avoid and recycle waste and how those correspond to government regulations and environmental standards.

Analysis of Development Opportunities and Potential Impact

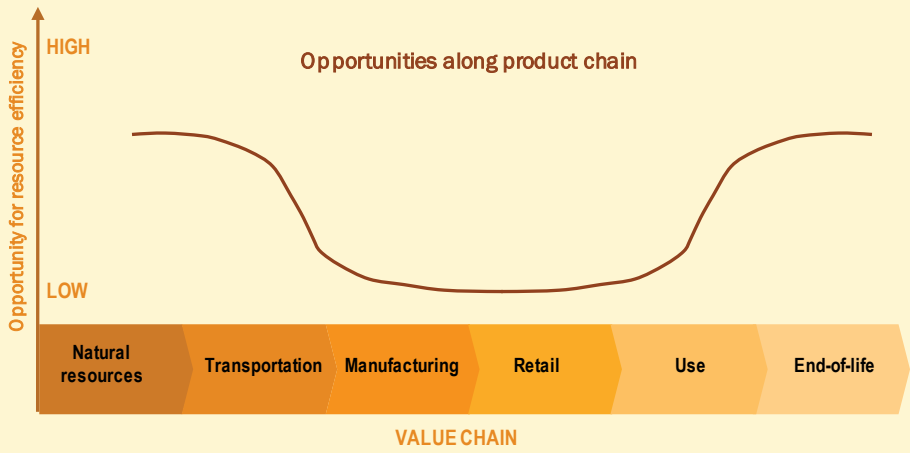
Any value chain that develops will eventually increase its use of materials, energy and water. In the diagnostic the analyst needs to reflect on the possible negative effects of a further development of the chain but also on the existing opportunities to develop the value chain towards a more sustainable production and use of energy. This must be done in reference to specific geographical and political context, and no blueprint exists on how to best go about it. However, there are a number of guiding questions that the analyst can take into consideration when creatively reflecting on opportunities, such as:

- Where can new technologies and mechanisms for sustainable use of resources be applied in the value chain? How can the application be promoted?

- Which of the available technologies for sustainable production and energy use can be most conveniently applied?
- Is it possible to develop new products in the value chain that are ecologically friendly in terms of production and consumption?
- Are there opportunities for scaling up the use of more sustainable technologies?
- Where is it useful to train people to use technology appropriately or preserve resources?
- How can the use of appropriate sustainable technologies be promoted?
- Are there opportunities for campaigns to educate consumers about the use of products that comply with standards of sustainable production and energy use?

It may be useful to focus the analysis on particular "hotspots" where environmental performance is critical. These can sometimes be detected from newspaper articles or through discussions with environmental groups. Development opportunities can also be identified in creative brainstorming engaging stakeholders and experts. Such opportunities could be illustrated, for example, on the value chain map (see Box 28).

Box 28: Illustrating Opportunities for Sustainable Production and Energy Use Along the Value Chain



Sources of Data

An easy shortcut to find out about the level of sustainable production and energy use that is applied in the value chain would be to find out if there are any standards applied for cleaner production or environmental sustainability. The landscape of green labelling and certification is broad, ranging from voluntary self-declaration programmes, third-party licensing programmes, single-attribute programmes, hazard warning programmes, and information disclosure programmes to test reporting. However, in a developing country context these schemes are only beginning to pick up.

Main sources of information in the diagnosis of sustainable production and energy use in the value chain should therefore be gathered directly from the value chain actors. Some of this information may be available from national and sector-specific statistics. The website www.materialflows.net provides some information on material flows at the

national level. Other information, such as the energy efficiency parameters, may only be gathered from factory managers and technicians. Interviews with business owners and particularly government and independent agencies that monitor environmental impacts and/or conduct environmental impact assessment may also help. Also, it is important that the analyst meet with one or two specialists in energy, water and biodiversity, preferably associated with an independent institute, to discuss main issues of sustainable production and energy use.

Resources for further reading

- Herndor M, M. Kuhndt and F. Tessema (2007). Raising Resource Productivity in Global Value Chains: Spotlights on International Perspectives and Best Practice. UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP).Wuppertal, Germany. Available from www.scp-centre.org
- WWF and SAB Miller (no date) Waterfootprinting: Identifying & Addressing Water Risks in the Value Chain. World Wildlife Fund (WWF) and SAB Miller. Godalming, UK. Available from www.wwfza.panda.org
- Jensen, A.A. and Remmen, A. (2006). UNEP Guide to Life Cycle Management – A Bridge to Sustainable Products. UNEP Life Cycle Initiative, UNEP Division Technology, Industry and Economics: Paris, France. Available from www.unep.fr
- Cohen-Rosenthal, E. (2004). Making Sense Out of Industrial Ecology: A Framework for Analysis and Action. Journal of Cleaner Production, 12: 1111-123.

Dimension 6: Value Chain Finance

> *Take note:* Actors in the various segments of the value chain have specific needs in terms of finance and different capacities to access it.

Enterprises in a value chain require finance to run their daily business efficiently, expand operations or upgrade and explore new markets. Guaranteeing timely access to adequate finance for all businesses in the chain is key to value chain development. Just as large traders and processors may require long-term loans, small and medium businesses supplying primary and semi-processed products to the industry likewise require specific financial products and services.

Sources of finance include formal financial institutions ranging from commercial banks to microcredit institutions; they also include informal sources, such as family and friends, moneylenders, group-based savings organizations or agents in the value chain, e.g., buyers who provide advance payment or suppliers who accept delayed payment. For example, a furniture maker may negotiate a forward contract with a retailer to produce a new line of furniture, or a farmer may be allowed to defer payment for inputs until after the harvest has been sold.

In the context of underdevelopment, finance is often not available. Where finance is available, providers often lack the capacity to adequately assess requests for finance and to manage risks. This applies in particular to formal financial institutions which often find it difficult to evaluate whether borrowers can and will repay. In other cases such providers are discouraged from lending out small amounts to small enterprises due to high transactions costs and difficulties in monitoring the use of funds.

These factors therefore raise not only the cost of credit, but also the barriers to accessing credit. Furthermore, certain segments of the value chain can be dominated by informal finance mechanisms or rely on self-financing such as savings and liquidation of assets. In most cases, these segments turn out to be severely underfunded, limiting expansion or upgrading of operations and leaving businesses vulnerable to adverse shocks. This can have stark implications: if finance is scarce in one segment of the chain, other parts cannot function effectively.

Objectives of the Diagnostics

The aim of this section is to support the analyst in understanding the supply of finance in the value chain, both from formal and informal sources, and to compare this with existing finance needs in the various segments of the value chain. Ultimately the analyst should be able to detect where lack of finance hampers the development of the value chain; give recommendations on how this can be improved in order to foster value chain development; and specify what effects financial interventions have on meeting generally agreed-upon development goals.

Guiding Questions

- How do investors rate the attractiveness of businesses in the value chain in relation to other chains and other sectors?
- How do investors rate the risks of financing activities in the value chain?
- How do the legal system, financial infrastructure, and social norms and customs support or impede informal and formal financial transactions within the value chain?
- How much and what type of funding is actually provided by a) informal financial sources and b) formal financial institutions? Is there any form of specific value chain finance?
- How much and what type of finance do businesses need?
- Are there ways that financing can be improved for the benefit of some or all of the actors in the chain? How can government and donor support contribute to this? What would be the impact of this improvement?

Useful Parameters

Figure 11: Roadmap to Diagnose Finance in Value Chains

PARAMETERS	DIAGNOSTIC TASKS	INDICATORS
6.1 Financial attractiveness	Specify to what extent investors are interested in financing businesses in the various segments of the chain and in the value chain as a whole	▪ Internal rate of return and net present value in various segments of chain ▪ Qualitative judgments on financial attractiveness of the value chain by main investors
6.2 Financial risks	Reveal basic information on perceptions about risks that investors should take into consideration in financial analyses	▪ Supply risks ▪ Production risks ▪ Sales/market risks ▪ Management risk ▪ Other risks
6.3 Norms and practices	Understand the economic and social conditions that constrain access to finance	▪ Common business/ banking practices ▪ Social norms and customs
6.4 Availability of finance	Establish a picture of existing funding sources and current funding practice in the value chain	▪ Formal credits ▪ Informal finance ▪ Value chain finance
6.5 Financing gaps	Identify gaps in supply of finance based on existing availability and expressed needs	▪ Relation between availability and identified needs

6.1 Financial attractiveness: The analyst should try to get a rough idea about how attractive it is for investors and financial institutions to lend to or invest in businesses in the value chain. Based on the financial attractiveness of different segments of the chain, the analyst can also try to extrapolate the financial attractiveness of the entire chain. Financial attractiveness depends on a) the creditworthiness of the business or agent seeking finance and b) the profitability of

the investment or loan, which is a function of the duration and the expected return generated, or interest and other costs that can be charged on the investment.

Box 29: Discounted Cash Flow Analysis and Internal Rate of Return

Discounted cash flow (DCF) analysis is a valuation method that uses projections of future cash flows generated by an investment, discounted at a given rate, to derive a present value for the investment. Any cash flow that occurs in the future has less value because it is not available for other purposes in the present; hence it needs to be discounted, usually applying the cost of capital specific to the business—this may simply be the interest rate offered by a bank, or the cost of raising funds through a share offering for companies with access to such avenues. The sum of the stream of discounted cash flows is called the net present value (NPV) of an investment; this is the present value of an investment at the current cost of capital (bank interest rate or other). Where the NPV is greater than the cost of making the investment, the decision will usually be to go ahead with the opportunity.

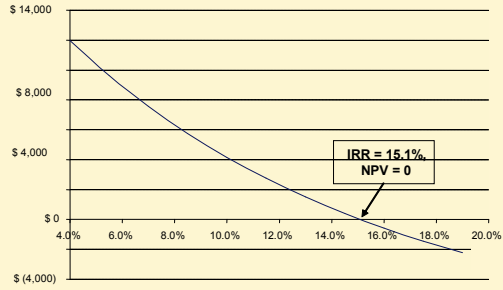
The internal rate of return (IRR) is one of the most basic concepts in investing. It is the discount rate that is set such that the NPV of a given investment is equal to zero. It indicates the rate of growth an investment is expected to generate. In general, the higher the IRR of the investment, the more desirable it is to undertake. For example, if a company is considering investing in a new refrigeration unit, it will look at the cost (a cash outflow) and the extra cash that it plans to be able to generate from having the extra unit over the next ten years.

Where the IRR of an investment is higher than the current cost of capital, the investment can be assumed to be profitable.

USD	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cost of newrefrigerationunit	(20,000)										
Additional revenuefromexpandedproduction		4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Cumulativenet cash flow	*(20,000)*	*(16,000)*	*(12,000)*	*(8,000)*	*(4,000)*	*0*	*4,000*	*8,000*	*12,000*	*16,000*	*20,000*

Cost of capital	NPV
4.0%	$ 11,965
5.5%	$ 9,621
7.0%	$ 7,565
8.5%	$ 5,756
10.0%	*$ 4,162*
11.5%	$ 2,754
13.0%	$ 1,509
14.5%	$ 405
16.0%	$ (575)
17.5%	$ (1,446)
19.0%	$ (2,222)

NPV @ 10.0%	**$ 4,162**
IRR	**15.1%**



NPVs and IRRs can be calculated using a formula, a financial calculator, financial websites or an Excel spreadsheet. However, for industrial project appraisal, a convenient software called COMFAR (www.unido.org/comfar) has been developed by UNIDO that is especially suited to the typical investment patterns and payment streams in industrial projects in developing countries. Among other measures, COMFAR yields plausible rates of returns for the different businesses in the value chain.

Creditworthiness depends on a borrower's ability and willingness to repay. Investors investigate the individual creditworthiness of borrowers along the value chain through a process of screening and evaluation, which usually involves financial statement analysis, stress-testing of business plans, and analysis of documentation such as sales records, credit history and others. The results of such evaluations of creditworthiness depend to a large extent on the degree to which investors are able to understand businesses in a value chain and accurately assess the risks involved. Financial attractiveness is most commonly approached via the discounted cash flow method of evaluating investments or net present values (see Box 29). An example of the financial attractiveness of various segments in the Nigerian palm oil value chain is depicted in Figure 12.

Figure 12: Financial Attractiveness of Businesses in the Nigerian Palm Oil Value Chain

	Internal Rate of Return on Investments	Tenor	Creditworthiness of Businesses
	1 – 23%	Up to 1 year	Low
Primary production of main supplies (in this case palm nut)	4 – 9%	2 to 5 years	Medium
Processing (palm oil, residues)	5.5 %	2 to 5 years	High
Processing of secondary products (special oils, use in foods and cosmetics)	5 – 15%	3 to 6 months	High
Trade, wholesale and retail			Medium

6.2 **Financial risk:** Those financing operations in a value chain—be they firms, private entrepreneurs or financing institutions—run the risk that the investment will not pay off as expected or, in the worst case, be lost. The investor may fail to realize a return on the investment (e.g. the interest payments in the case of credit) or principal, or may face additional collection costs. The risk of financial default can be associated with a number of risk factors commonly monitored by the risk management function of banks and other investors:

- *Supply risk:* Production requires a continuous supply of raw materials and inputs (see section 3.1). If such supplies are not abundantly and easily available in the market, the firm needs to assure that it is able to procure them in sufficient quantity and quality; fixed contractual relationships with buyers is one such procurement method. Firms may even consider supporting suppliers with advances (in kind and cash) and engaging in the bulking and transport of the supplies. However, there is always a risk that firms will fail to procure the supplies, or fail to recover the advances they provide to suppliers,

as producers may decide to deviate from the agreed contract, for example by selling to a different buyer who offers better conditions.

- *Production risk:* This relates to the inherent risks in the production process (see section 3.2). Machines can break, accidents can occur, intermediate products may be damaged or stolen. The production risk depends on the quality and age of the equipment used and its appropriateness in the manufacturing processes and the know-how applied in using it. In the production of primary materials, such as agricultural products, production is often prone to the vagaries of weather conditions and fluctuating availability of inputs.
- *Sales and market risk:* Markets for manufactured goods can be extremely volatile. Prices can go up and down according to competition, availability of products and their substitutes and changing demand by consumers and buyers. Risks increase when there is little market information, or when markets in one place are not connected to the markets in other places. Risks can be reduced by having greater stability in supplier-buyer relationships.
- *Management risk:* Poor or bad management may lead to inefficient use of materials and processes, and financial losses. If management does not take prudent or correct decisions the firm may not have adequate cash flow to meet its financial obligations, rendering it illiquid or insolvent. Regardless of the scale of an enterprise, managers need to ensure that the business adjusts to changing market conditions and the political and legal environment.

> ***Take note:*** *Financial analysis is the task of investors. The diagnostic should only provide basic information about risks that investors need to take into consideration.*

- *Other risks:* The political and legal environment is often a source of uncertainty. Firms may become subject to new legislation and governments can impose new standards and intervene in markets. The quality of infrastructure, such as roads, water and electricity supply, is another risk factor, as is the availability of efficient transport and trading services.

Financial analysis and financial valuation tools generally follow the rule of "garbage in, garbage out". Although many analysts effectively rely only on a small pool of information, this is not recommended, as the analysis is effectively reduced to the level of an individual business. Analysts should rather seek to elaborate a comprehensive picture of the entire chain, taking into the account the interconnectedness of the businesses therein (see Figure 13 for an example). Banks tend to conduct financial analysis on quite a technical level. If banks consider the risks that result from such calculations too high they request further security such as collateral and third-party guarantees.

Financial risks can be mitigated using mechanisms that also contribute to the smooth functioning of value chains, for example, by minimizing supply and sales risks through the use of forward contracts, as well as insurance products, guarantees and collateral.

Box 30: Financial Risk Analysis in the Nigerian Cassava Value Chain

Figure 13 provides a schematic overview of the types of risk that typically occur in the Nigerian cassava-starch value chain and can be used to structure risk analysis. As well as identifying the nature of risks and evaluating their magnitude, the table suggests that the analyst identify available information on the risk-mitigation strategies in place and the likelihood that these are effective. Of course, risks and measures to deal with them will differ in each value chain; this table merely provides a guideline to analysts.

Figure 13: Overview on Financial Risks in the Nigerian Cassava-Starch Value Chain

Risk category	Nature of risk	Risk level	Implemented risk mitigation strategies	Likelihood that strategy becomes effective
Supply risks	Drought, Floods	medium	Drought-resistant varieties introduced	Medium
	Contamination of product due to inappropriate storage and transportation	High	Introduction of quality testing at reception at factory	Medium
	Insufficient production	High	Contract farming Establishment of factory-owned plantations	not established yet, cannot cover all supplies required
Production risks	Inefficiency due to aging machinery and equipment	Low	Investment in new processing equipment	low, given existing overcapacity
	Quality / food safety standards are not met	Low	Implementation of quality control measures	High
	Lack of technological know-how	medium	Hiring of new staff/technicians and training for those existing	Medium
Sales/ market risk	Lack of market demand for starch	non-existent		
	Price for starch drops	low	Extending profit margin per unit	Low
Management risks	Business is not managed profitably	medium	Improving managerial skills	Low
	Firm has too many outstanding liabilities	high	Extension of working capital	Medium
Other risks	Electricity and water supply remains unstable	medium	Independent electricity generators & water supply put in place	High
	Government introduces new food safety standards and monitors their implementation	high	Implementation of advanced quality control measures	Medium
	Other segments of value chain receive insufficient finance	high	Partly supplying finance to producers	Medium

6.3 Norms and practices: When undertaking analysis of the financial situation of a value chain, it is important to keep in mind the established organizational, social and cultural norms and practices that prevail within financial systems in the country, as well as the rules that permeate the value chain context. These may support or impede formal and informal financial transactions within the value chain concerned. Some of the most important aspects in this regard are described below:

> ***Take note:*** *The organizational, social and cultural environment affects access to finance. A rapid analysis identifying the major problems in the financial system helps to understand the measures that can improve finance in specific value chains.*

- *Supervisory and regulatory frameworks:* Traditional regulation by banking supervisory authorities tends to focus on documentation, such as proof of formal collateral, audited financial statements, etc. This means that where any of these is absent, banks must automatically provision a greater proportion of the loan (i.e. hold a higher amount of reserves on their balance sheet), which impacts negatively on their profitability (as they cannot lend out the money they are holding as reserves). The risk-based approach to supervision and regulation is more conducive to facilitating bank lending to actors who cannot meet such strict documentation requirements, as banks are regulated on the basis of their ability to manage risk. This approach is becoming more and more common in developing countries, and encourages banks to enter new segments in order to diversify their asset portfolios.
- *Legal and judicial infrastructure:* Weak legal and judicial systems and other mechanisms for accessing information and enforcing contracts are an important factor in determining how, and to whom, banks will lend. This affects the possibility of using available assets as collateral; for example, weak land tenure and ownership rights. Such uncertainty exacerbates already low levels of perceived creditworthiness.
- *Cost of reaching difficult markets:* Actors further up the value chain tend to be more geographically dispersed, often in rural areas with poor access to transport or ICT infrastructure, which makes such segments very difficult for formal financial institutions to reach. Banks are beginning to reach out to these markets, but given the high cost of the investment it entails, facilitating measures by governments and donors are usually involved (e.g., reinforcing judicial measures, supervisory frameworks etc.). This also affects the type of products and services banks can offer, as the investment involved in developing new, more suitable ones may not make sense in terms of the potential market size.
- *Shallow financial markets:* Furthermore, many banks in developing countries face difficulties in accessing long-term funding to run their businesses. This limits the range of products offered to customers; they tend to provide working capital for manufacturing activities, but are much more reluctant to offer medium or long-term loans for capital investment such as buildings and equipment.

- *Bureaucratic inertia of financial institutions:* Along with high costs, there is inertia within the bureaucracies of many financial institutions with respect to changing how they do business. Cumbersome procedures and lack of institutional incentives to understand and exploit new business opportunities are key factors in this respect; for example, loan approvals may be centralized in a national headquarters, making for a prohibitively long turnaround time for many applicants.
- *Social and cultural norms:* Aside from these factors, there are established norms and practices within different societies that influence the flow of finance to or within value chains. These can be based on cultural, social or religious affiliations, as well as gender, age or other markers (see Box 31).

Box 31: Reputation as a Determining Factor in Accessing Finance

Reputation is an important determining factor for accessing both formal and informal sources of financing in many developing countries, particularly within tightly-knit communities. The poor payment record of one member of a network of merchants can be reported and result in that member being ostracized from the whole group. By reporting a default, an aggrieved creditor spreads the bad reputation of the delinquent; the threat of this happening amplifies the costs of default and reduces its incidence. These reputation networks are generally formed of people with a common ethnicity, for example Lebanese and Syrian in many countries of West Africa, Asante in Ghana, and others. The same dynamics can pertain to social networks, such as graduates of certain schools, etc.

Source: Honohan and Beck (2007), Making Finance Work for Africa. Available from www.businessgrowthinitiative.org

6.4 Availability of finance: The availability of finance in the value chain concerns the quantity or volume of financing required by actors and what they can obtain, and the quality or suitability of financing for their needs. Both of these depend on the various sources of finance. Formal sources such as commercial banks may provide larger loans for capital investment, but require significant collateral or extensive documentation, which is a barrier to smaller and informal businesses. However, small businesses also require capital investment, and this may be a key constraint for particular segments. In a developing country context, firms often face restricted access to formal sources of finance. As a consequence, value chains are often underfunded, with businesses further upstream from markets generally facing higher barriers. In many cases actors with the easiest access to finance provide financial services to other parts of the value chain.

> ***Take note:*** *Value chain diagnostics should reveal information about the existence of the finance sources that are available in the value chain, in general and to each of its different segments. The diagnostics should also reveal where there are gaps in the supply and suitability of finance.*

a) Formal finance: Formal sources of finance (commercial banks, microfinance institutions, group savings associations etc.) may provide finance to a particular business as part of a larger strategy to support development in certain sectors or to diversify its portfolio. Banks provide a range from short-term loans to cover working capital needs, to medium- or long-term loans to cover capital investment. Microfinance institutions tend to provide small amounts, which may cover working capital but rarely enough to expand production, and repayment periods are usually short. Formal financial institutions always assure profitability of the loan or investment on the basis of financial attractiveness and risks.

Take note: It is useful to develop a fact sheet on the most important characteristics of existing investments and loans to get an overview of the quantity and quality of finance for each segment of a chain. Box 32 provides common traits of financial products.

Box 32: Common Traits of Formal Financial Products

Purpose	What is the money used for?
Amount	How much money is requested? Average size of loan?
Period	What is the average period? Is it short, medium or long term?
Disbursement	How is the money disbursed (e.g., in instalments or all at once)? To whom is it disbursed?
Repayment	How must the loan be repaid (e.g., in instalments or all at once)? In what form must it be repaid (e.g., in cash or in kind, perhaps by deducting the loan from the value of the supplies that is delivered)?
Interest rate	What is the interest rate? How does it compare to common interest rates of other sources and in other sectors?
Security	How is the investment secured? What are the common collateral, insurance and guarantees required? How can the lender be sure of being repaid?
Liability	Who has to repay? Who is held responsible in case of default? What are the penalties and procedures in case of default?
Transaction costs	How difficult is it to obtain financing? What are the costs involved (e.g., transport, opportunity cost)?
Information required for approval	What information does the lender require before the loan is disbursed?
Information required for monitoring	What additional information does the lender require during the period?
Time lag between application and disbursement	How long does it take?

Source: Based on KIT, 2010

b) Informal finance: Given the fact that formal sources of finance are often not available in the developing country context, informal sources become very important. This occurs when the provider operates in the informal sector, such as moneylenders or friends and family, or when formal actors in part of the value chain provide finance informally as an ancillary service to assure the functioning of the chain. For the first type, many businesses in developing countries find such finance convenient because cash is immediate, repayment terms are flexible, and there is less paperwork than with formal financial institutions. For the

Take note: One needs to understand the often complex mechanisms of informal finance in the value chain, and the associated costs (interest or other) that arise for the borrowers.

second type, chain actors often develop quite substantive systems of informal "direct" value chain finance. The motive for this is very rarely the profitability of the loans, but rather to secure supply of inputs and sales and transport of end-products or other essential functions in the chain. Transfers can be cash, credit, or in-kind (e.g., inputs for production such as seeds or fertilizer). Where inter-firm relationships are transparent and trust-based, informal direct value chain finance is easier to organize. Informal value chain lenders may be able to operate with lower transaction costs, as they have better-informed perceptions of risk in both the sector and individual borrowers through their constant and recurring relationships with suppliers. However, informal lenders may themselves often have limited financial liquidity. There are also cases where informal finance incurs such high costs that it impedes development of the value chain. The box below describes some of the most important informal means of finance provided by value chain actors. The analyst will need to obtain a qualitative description regarding the prevalence of these mechanisms in the value chain.

Box 33: Informal Direct Value Chain Finance Mechanisms

Delayed payment: This allows manufacturers to delay payment of supplies for a certain time so it can process and sell the final product. The duration is usually 1 to 3 months.

Advance payment: Involves payment to suppliers in the expectation of proximate delivery. Cash advances are often used to organize delivery and transport of production. In other cases, as in agriculture, advances are used to meet costs of production and harvest or for the collection of primary materials.

Trader credit: Traders can provide in-kind loans (in the form of inputs) to suppliers who have limited liquidity. The duration of such credits may correspond to the time it takes to produce the supplies, usually less than a year. The trader's goal may be to assure that supplies are produced in sufficient quantity as well as to build trust with suppliers. The loan will be repaid when the supplier delivers the product to the trader.

Supplier credit: Involves short-term, seasonal loans for suppliers to meet their credit needs in the production of supplies. When provided as a loan, it tends to be limited to working capital (for inputs). In some cases, e.g., with primary agricultural producers, it can also include the in-kind provision of inputs such as fertilizer and seeds. The relationships between the buyers and sellers are often temporary and demand-driven. However, in other cases the establishment of stable contractual relationships allows suppliers and buyers to better plan operations. The credit agreement can be integrated as part of the contract.

Forward selling contracts: These allow manufacturers cash revenues for sales of products before they are actually delivered and/or produced. These may be 1to3-month advances that buyers grant to producers of goods and services. This allows traders to procure products and provides a farmer with needed cash as well as guaranteed sale of outputs.

Source: Based on KIT, 2010

c) Purpose-based value chain finance: Value chain actors with easier access to financing may often end up providing financing to other actors in the chain in order to ensure the success of their own production. This may take place in the normal course of business, but recognizing the potential to leverage such chain relationships is important in enabling more coordinated (and complex) financing mechanisms by bringing in financial institutions. In value chains, suppliers, buyers and financial institutions can establish a triangular

relationship. For example, if the buyer provides a guarantee based on the record of good business relationships with a supplier, the bank can provide finance to that same seller. Alternatively the bank can give out a loan that the buyer then hands down to the seller. There are also situations where the supplier receives a loan and uses it in part to grant delayed payment to the buyer.

Such triangular relationships are able to overcome critical constraints in finance, such as costs of evaluating and monitoring creditworthiness of borrowers, lack of understanding of businesses in the chain on the part of financial institutions, lack of guarantees and collateral on the part of the borrower, and cumbersome loan-granting procedures. The triangular relationship can even extend to more actors. For example, suppliers may deliver to a primary processor, who then sells the product to a secondary processor. A bank will be able to assign credits to one or all of these actors if they are able to record stable contractual relationships. In the end, one bank can simultaneously finance all actors, from suppliers to end-buyers, who maintain business relationships in the value chain (see the example on cascade financing in Box 34). The logic is that financing one part of the value chain may often be ineffective and risky if it is not assured that other parts of the value chain also receive financing. The bank would maintain accounts for all the actors, a mechanism that provides additional security. It would also need to acquire an in-depth understanding of the businesses in the chain in order to evaluate its systemic creditworthiness. Finally, governments can provide additional risk guarantees that help banks to secure their loans to value chain actors and facilitate lending.

Box 34: Rabobank's Concept of Cascade Financing in the Flower Sector

All actors in a flower value chain, including seed onion suppliers, green house manufacturers, fertilizer providers, flower producers, transporters, traders, wholesalers and retailers, maintain a credit line with Rabobank. The bank has accumulated intimate in-house knowledge of production factors, equipment suppliers, and equipment buyers in order to evaluate creditworthiness of businesses in this specific value chain. All actors receive their money and deposit it in a Rabobank account, so the Bank can later debit their accounts for loan payments. In addition to providing credit, the Bank invests in market analysis and technological foresight as a service to render businesses in the value chain more profitable in the future. In effect, Rabobank has locked up financing for the entire chain, and as such is a main investor and responsible for its success.

Source: Coon, Campion and Wenner 2010. Financing Agriculture Value Chains in Central America. Technical Notes 146. Inter-American Development Bank

6.5 **Finance gaps:** While the previous parameters concern the supply of finance, the examination of gaps in finance along the value chain touches on the demand side. Analysts need to identify where there is a clear demand for finance that is not being sufficiently met. Once again, this concerns both the quantity (volume) and quality (or suitability) of finance in the chain. Gaps may exist in both respects, leading to businesses being underfunded, a common characteristic of many developing country value chains.

Financial needs can best be established by understanding the businesses in the value chain. Financing needs differ across and within value chains, depending on the segment of the chain and on the purpose of the credit. It is worth noting for the analysis that effective demand for finance from businesses may be constrained by a number of factors, such as lack of awareness or understanding of available options, and the informal nature of many enterprises. A first indication of finance needs in a value chain is to examine the capital intensity of businesses (see Box 35).

Box 35: Capital Intensity vs. Labour Intensity

A business is capital-intensive if it requires large amounts of fixed capital or investment for production, in relation to other factors, mainly labour. In capital-intensive industries firms usually need to buy expensive machines and high-tech equipment upfront. This creates a need for long-term, large-scale finance to fund these purchases, which are "sunk costs," i.e., they cannot be easily recovered. Examples are heavy industry, oil refining, railways and airlines. Other activities, such as agricultural production, handicrafts, and services, are commonly regarded as capital-extensive and labour-intensive; such businesses may require very little capital to get up and running, but have much higher variable costs in terms of wages, leading to a greater need for working capital finance or other forms of short-term credit. The concept of capital intensity or labour intensity can be applied to value chains as a whole. Meanwhile, it is also useful to distinguish between the capital and labour intensity of the different segments of the value chain. For example, primary agricultural production tends to be labour-intensive whereas agro-processing may be more capital-intensive.

Each segment of the chain may require a different mix of short, medium and long-term finance. In practice, short-term credit needs, such as working capital, can be financed with an overdraft or revolving credit line or on the basis of assets available to business. Similarly, fixed assets can be financed by term loans; moveable assets by vehicle & asset finance, and agricultural inputs by agricultural production loans (short-term credit repaid in full at the end of each season). Figure 14 provides a generic scheme that helps to understand the purpose and type of funding required for matching with what is available.

Take note: *Having identified common financing sources and practices in the value chain, the analyst can match availability of finance to needs as expressed by business owners in the different segments of the value chain.*

Sources of data

A main source of information to assess finance in the value chain should be interviews with main lenders and investors. An equally important source is business owners with finance needs and/or experience with successful or unsuccessful loan applications. Additional information should be gathered from reports on business climate and the status of lending. On a more detailed level there may be sectoral, value chain and project planning documents, as well as calculations available on investment project appraisals (to obtain information on financial attractiveness, for instance).

Figure 14: Financing Needs and Corresponding Types of Finance in a Value Chain			
	Need *The generic categories below can help to define the specific needs.*	**Type of Finance** *Explanation of the possible finance mechanisms than can be used. The generic types of finance below can help to define specific types of finance as they exist in the value chain.*	**Availability** *Information on whether existing finance mechanisms match what is needed. A rating can be applied (e.g. more than sufficient, sufficient, not sufficient, and highly insufficient).*
Primary Production	Inputs	• Short-term production loan • Revolving credit line • Supplier credit (from input industry) • Advance payment (from processors)	
	Operating expenses	• Short-term production loan • Revolving credit line • Supplier credit • Advance payment • Warehouse receipt system	
	Equipment	• Term loan • Vehicle & asset finance (leasing, rental, instalment sales)	
1st/2nd Level Processing	Working Capital (including advance payments to suppliers)	• Overdraft • Revolving credit line • Asset-based finance – factoring (accounts receivable), inventories, etc.	
	Fixed Assets (plant, property)	• Asset finance (leasing, rental, instalments sales) • Commercial property finance (warehouses, factories, industrial premises)	
	Equipment (machinery, capital equipment)	• Term loan • Vehicle & asset finance (leasing, rental, instalments sales)	
Wholesale, Retail & Marketing	Working capital	• Overdraft • Revolving credit line	
	Fixed Assets (incl. wholesale warehouses, transport vehicles etc.)	• Term loan • Commercial property finance • Vehicle & asset finance	
Export	Working capital (pre- and post-shipment)	• Export credit line • Letter of credit/forfeiting • Bills of exchange • Factoring	
Storage	Working capital	• Overdraft • Revolving credit line • Asset-based finance – factoring (accounts receivable), inventories, etc.	
	Fixed Assets	• Commercial property finance • Term loan	
Trading	Working capital	• Overdraft • Revolving credit line	
Transport	Working capital Vehicles	• Vehicle & asset finance • Overdraft	

Analysis of Development Opportunities and Potential Impact

Preferably, the analyst would present a narrative on each of the above parameters presenting the related qualitative and quantitative information and data gathered. The analyst could also apply a simple rating to qualify the finance gaps in the value chain based on the suggestions in table 6.1. The reference for such a rating can be the situation in the value chain of a competitor or neighbouring country/region. The situation in another value chain in the country or region can also provide a reference. In the diagnostic the analyst also needs to reflect on the opportunities existing to develop the value chain. Though there is no general recipe, there are a number of guiding questions the analyst can consider when reflecting on certain opportunities:

- Can new mechanisms of formal, informal and value chain finance be introduced? What are the constraints to their introduction?
- Can banks and financial institutions become more educated about the nature of businesses in the value chain and the types of needs that exist? Could they develop more appropriate financial products as a consequence?
- Can firms be brought together with financial institutions and investors? How can this be organized in a way that results in increased trust among them, and how could this ultimately increase lending?
- How can businesses practices, accounting and contracting among small and medium-sized enterprises be formalized in a way that would allow more substantial formal and informal finance?

Development opportunities can also be identified through creative brainstorming engaging stakeholders and experts. Finally, the analyst must reflect on how realizing the development opportunities identified will affect the predefined development goals. For example, what is the expected impact of improved access to finance in the chain on poverty reduction, employment and income, economic growth and cleaner production? Some of these effects may be rather generic. In the end, the diagnostic most likely will not come up with a comprehensive impact assessment study, but an intuitive reflection about what may happen.

Resources for further reading

- Fries, Robert and Banu Akin, "Value Chains and their Significance for Addressing the Rural Finance Challenge, Micro REPORT No. 73, USAID, AMAP, Washington, D.C., December 2004. Available from: www.microlinks.org
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- Honohan, P. and T. Beck (2007). Making Finance Work for Africa. Washington, D.C.: World Bank. Available from https://www.businessgrowthinitiative.org
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- KIT and IIRR (2010). Value Chain Finance: Beyond Microfinance for Rural Entrepreneurs. Royal Tropical Institute, Amsterdam; and International Institute of Rural Reconstruction, Nairobi. Available from http://www.kit.nl/publications

Dimension 7: Business Environment and Socio-Political Context

Businesses in a value chain have to act and react to what happens outside the factory and office walls. The factors that affect businesses in the value chain are known as business environment, macroeconomic conditions, or socio-political framework. They include conditions of public policy, norms and customs, laws, regulations and administrative procedures, market institutions, trade regulations, infrastructure and public services. The conditions extend from the local and national to the international level. Where the business environment and policy context is transparent and predictable, businesses can plan and adjust their operations to become more productive, innovative and profitable. Mostly, actors in value chains have limited means to alter these conditions in their own interest. However, being aware of the business environment and socio-political conditions and influencing them where possible is vital for businesses in the value chain to be successful. It is also important to foresee, with sufficient anticipation, how conditions may change.

Objectives of the Diagnostics

The aim in this section is to enable the analyst to provide an overview of the business environment and socio-political framework conditions in a country and to reflect on how those may affect the situation in the value chain of concern. Finally, the analyst should also be able to provide some recommendations on how policy measures and improvements to the business environment and socio-political framework conditions would contribute to development in the value chain.

Guiding Questions

- How costly is it and how much time does it take to set up and run a business in compliance with the regulatory and administrative requirements?
- What trade regulations affect businesses in the value chain?
- What complementary services, ranging from roads, to construction of houses, to education and research, are available to foster development in the value chain?
- What social norms and institutions influence business culture and behaviour of actors in the value chain?

Useful Parameters

Figure 15: Roadmap to Diagnose
Business Environment and Socio-Political Context in Value Chains

PARAMETERS	DIAGNOSTIC TASKS	INDICATORS
7.1 Business environment	Determine how difficult it is to set up and run businesses in the value chain. Specify the legal, regulatory and administrative requirements directly affecting businesses in the value chain	▪ Ease of doing business indicators ▪ Private sector contribution to the economy ▪ Foreign direct investment inflow and its distribution across sectors ▪ Legal regulatory and administrative requirements to do business (accreditation, license, permits, etc.)
7.2 Product and trade regulations	Determine how production and trade regulations affect businesses in the chain	▪ Restrictions to sales and exports ▪ Duties and levies to be paid ▪ Administrative requirements in trade (accreditation, license, permits, etc.) ▪ Quality requirements ▪ Processes requirement (safety, social standards, environmental standards)
7.3 Public and private service provision	Identify to what extent services are available and sufficient	Indicators related to the availability and quality of services in the field of ▪ Construction ▪ Transportation ▪ Road, rail and port infrastructure ▪ Electricity and water ▪ Business consulting and accounting services ▪ Market information services ▪ Grading and standard regulating bodies ▪ Research and laboratory services ▪ Education, training and knowledge providers
7.4 Social and cultural context	Understand the causes of behaviour, business culture and social norms	▪ Social groups engaged in businesses ▪ Institutions of trust ▪ Rationale in contractual relationship

7.1 Business environment: Starting up and running a business is challenging. An indicative, though not exhaustive, list of costly administrative and bureaucratic hurdles includes: regulations that must be complied with, licenses and permits to acquire, inspections to accommodate, government officials to contact, information to provide to public registers, etc. The efficiency and effectiveness of the government's interventions in the area of business regulation as well as the availability and performance of public and private services mark an economy's business environment. This will impact on differences in how costly—in terms of time and money—it is to comply with general and specific regulatory and administrative requirements (start and close a business; obtain licenses, registrations and permits; pay taxes; deal with inspections, etc.). For example, in Cameroon, at one time an exporter needed to contact nine different government offices to be able to ship products through the international port of Douala, whereas in Brazil tax procedures have become so complicated that complying took an entire year. In many countries, exporters need to be accredited and fulfil special

conditions; obviously, such conditions shape the fate of businesses in value chains, particularly those connected to global markets.

Conditions in the business environment are commonly summarized in business climate indicators. For example, the World Bank's "Ease of Doing Business Index" (www.doingbusiness.org) measures legal and regulatory requirements directly affecting businesses. The index is not based on national accounting data, but on interviews with government officials, lawyers, business consultants, accountants and other professionals. A nation's ranking on the index is based on the average of ten sub-indices in the fields of starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, cross-border trading and enforcing contracts. Using the sub-indices is often more useful than the aggregate. Another useful indicator is the "Competitiveness Index" of the World Economic Forum's Institute for Management Development, published in the World Competitiveness Report (www.weforum.org).

Take note: Information on the business environment is mostly available in the form of business climate comparison indicators. These can be complemented with information from national statistics, such as private sector contribution to the economy or level of foreign direct investment. Anecdotes gathered in personal interviews with firms can help reveal major business constraints.

Such indices are aggregated and only allow for comparison between countries (and sometimes regions). It is therefore useful to complement the information with data that refers to the situations in individual value chains and their segments. Possible indicators that the analyst may consider discussing include:

- Number of days required to set up a business in the value chain
- Number of start-up businesses/enterprises failed in the various segments of the value chain
- Level of foreign direct investment in the value chain

Finally, during interviews with business representatives, the analyst can collect anecdotes about cases where legal and regulatory requirements and other constraints have hampered the ability of businesses to operate in the chain.

7.2 **Trade regulations:** In some cases, the above-mentioned business climate indices may already include certain information on the ease of trading across borders. However, it may also be necessary to find out about the detailed regulations on the production, sale and export of a product. Here it will be necessary to distinguish between regulations in and outside the country:

- *National policies and trade regulations:* This includes the extent to which national policies and regulations such as tariffs, bans, quality requirements, administrative procedures and product and food safety standards affect what is produced and how it can be traded within the country and across borders. An analysis is also needed of the functioning of national marketing boards and market institutions such as commodity exchanges.
- *International trade regulations:* Under this topic one would look at existing international trade regimes, agreements and import restrictions that affect the trade of products of the value chain. It may be important to examine common trade agreements under the World Trade Organization, the Lomé Convention

or regional bodies such as MERCOSUR or NAFTA. Meanwhile, there are international regulations dealing with health, food safety, chemical specification and compliance with social standards.

For outsiders it is usually difficult to identify and understand all the relevant regulations for trading a product. Stakeholders in the chain, whether representatives of firms or business promotion agencies, usually have sufficient information at hand that can be used for an initial diagnostic. However, if new product markets are to be explored the exercise may include a detailed appraisal of legal texts and technical specifications, going well beyond the scope of this diagnostic where the focus should be on identifying only the most important regulations and, particularly, understanding how they affect businesses in the chain (see some guiding questions in Box 36).

Box 36: Guiding Questions to Study Production and Trade Regulations

- Can the product be sold on the local market/exported?
- Is there a duty or levy that must be paid to sell/export the product? How high is it?
- What kind of administrative requirements must be fulfilled to produce, sell or export the product (accreditation, license, permits)?
- Do exporters have to adjust a product's quality to be able to sell/export it? What efforts would this take?
- Do exporters have to adjust production processes (safety, social standards and environmental standards) in order to sell/export the product?

7.3 Public and private service provision: Businesses in a value chain require inputs and services that are delivered by public and private service providers. It depends on the specific country context as to whether certain services are provided by public agencies or by private companies. In any case, for the firms in the value chain the quality and the reliability of the service are crucial. Main types of services that firms in the value chain usually require include:

Take note: Traders and exporters know a great deal about restrictions and regulations. Focused interviews with main traders can be rewarding and save the analyst from studying legal texts, national policies and international agreements.

- Construction
- Transportation
- Road, rail and port infrastructure
- Electricity and water
- Business consulting and accounting services
- Market information services
- Grading and standard regulating bodies
- Research and laboratory services
- Education, training and knowledge providers

For the diagnostic the analyst should develop a description of the existing capacities in all of the above services. Interviews with main service providers may be useful here. However, information on the validity of the service provided should

be crosschecked with a number of firms in the value chain that have used such services.

7.4 Social and cultural context: It is not only economic framework conditions and policies that determine the behaviour of firms, individual producers, workers and others in the value chain; there are also social and cultural factors to be considered. Social norms may be influenced or determined by gender, race, ethnicity, tribes, regions, class, religion, etc. Such rules and norms do not arise arbitrarily, and have historical roots. They can be powerful determinants in the decisions of individuals with respect to what they want to achieve, with whom they do business, with whom they collaborate, and whom they trust. For example, whether a small business owner pays back a credit or delivers on time depends not only on the contractual arrangements he or she worked out with business counterparts, but also on societal norms that may allow delayed repayment or delayed delivery under certain conditions.

Take note: Some services may be available in abundance but at poor quality or at high cost. Availability of other services may be scarce, or there is stark competition and some actors may have preferred access.

Take note: It is essential to have an idea of the unwritten rules of a society to understand how and why actors in a value chain behave. Such information is difficult to obtain and requires careful interpretation. Rather than falling into sweeping judgments about the un-business-like behaviour of business operators, it is important to understand the motivations for social conduct and business behaviour.

As it is difficult to find objective and quantitative data on social and cultural norms, the diagnostic will most likely need to focus on qualitative data and interpretations. Information is best gathered from interviews with not only business owners but also focus groups in the value chain. Some questions that could orient the analyst in the interpretation of the information are included below:

- What ethnic groups, societal classes and gender groups are engaged in the various segments of the value chain? Can individuals of any other group participate?
- Which institutions build the basis for trust and business relationships in the chain?
- What social norms guide the contractual relationships established between buyers and seller?

Analysis of Development Opportunities and Potential Impact

The analyst may need to bear in mind that improvement in the business environment and socio-political context usually far exceeds the scope of any value chain development intervention. That does not mean that governments and development agencies should not engage in changing and improving policies and infrastructure to the benefit of value chains and the actors therein, only that improving business conditions requires large-scale programmes that go far beyond targeting a specific value chain.

The analyst, through the diagnostic, can contribute to the design of such macro/infrastructural policies and programmes. These ideas can become inputs into reform processes that are not only of benefit to the value chain but to the entire

economy, leading to faster growth, less unemployment, more gains from value addition and trade, more profitable businesses, reduced poverty and other social benefits. Below are a number of issues the analyst may take in consideration when reflecting on opportunities to improve the business environment:

- Are there ways to support initiatives addressing macro level constraints that affect businesses in the value chain?
- How can labour regulations be improved so that they benefit workers while maintaining profitable businesses?
- How can a public-private dialogue be facilitated?
- How can internal sales and export regulations be simplified and modified to increase the chances for more productive/competitive businesses in the value chain?
- How can public and private support service providers be strengthened?
- How can certain marginalized groups of the society be empowered so that they are able to participate and benefit in the value chain?
- How can sector-specific legal regulations be introduced and enforced?
- How can access to basic infrastructure be improved?

Opportunities can also be identified through creative brainstorming engaging stakeholders and experts. Finally, the analyst must reason about how meeting the identified development opportunities will affect the predefined development goals, including the impact of improved framework conditions for chain development on poverty reduction, employment and income, economic growth, enterprise development and cleaner production? At the end the analyst may reflect, hypothetically, on how certain societal groups in the value chain would possibly react to certain value chain interventions.

Sources of Data

Information on business environment and socio-political context is complex, difficult to obtain and hard to interpret according to a “blueprint”. This guide suggests a short-cut approach using available indicators on business climate such as those available from the World Bank and other development agencies, and complementing them with information available at the level of countries and value chains regarding the role of the private sector, product and trade regulations, public and private service provision and social and cultural context. This information can best be complemented and verified with qualitative data gathered in interviews with business owners as well as trade and business promotion agencies. Some complex information on social and cultural norms can also be verified with social scientists versed in this issue.

Resources for further reading

- Kleinberg, S. and R. Campbell (2008). Business Enabling Environment and the Value Chain. Briefing Paper. USAID. Available from www.microlinks.org
- DCED (2008). Supporting Business Environment Reforms: Practical Guidance for Development Agencies. Donor Committee for Enterprise Development. Available from www.business-environment.org
- OSCE (2006). Best-Practice Guide for a Positive Business and Investment Climate. Org. for Sec. and Coop. in Europe. Vienna, Austria. Available from www.osce.org/eea/19768

Part 4: Using Diagnostic Results

Value chain diagnostics is usually part of a wider process of design and implementation of value chain development projects and, as explained in section 1.4, can be used as a panoramic snapshot at any of the stages of the project cycle. The aim of this section is not to provide guidance on project cycle management; most readers may be well versed in this field and a number of good guidebooks on developing and implementing value chain development projects are available. Rather, the aim of this section is to provide a brief set of recommendations to help ensure that the results of the diagnostics are put into practice effectively within any given process of value chain development.

> ***Take note:*** *There are different types of value chain interventions, depending on the weakest elements in its functioning.*

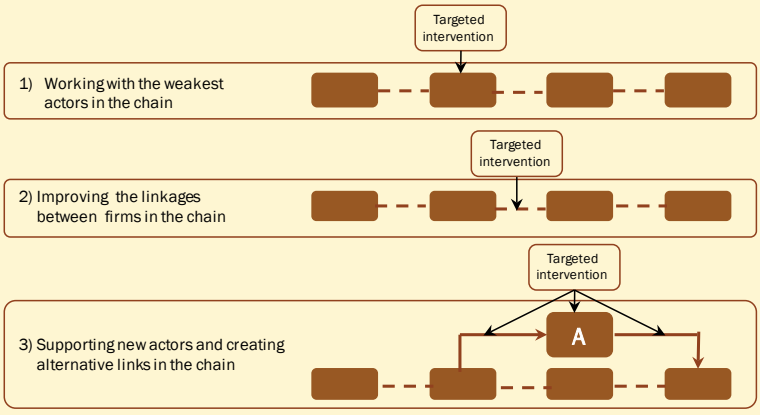
Value chain diagnostics fit into a process of value chain development that can pursue different objectives based on the intervention logic applied. One can distinguish three main types of donor intervention related to value chain development (see also Box 37):

(1) Strengthening the weakest actors to address a possible bottleneck in the chain. Here the assumption is that development of the weakest segment would trigger the development of all the other segments in the value chain.

(2) Improving linkages that allow flows of knowledge and resources to take place that make firms in the chain more productive. The assumption is that the weak linkages between segments and chain actors hinder the development of the chain. Improving the connectivity in the chain, for example by introducing a quality control protocol with which all actors across the chain must comply, is expected to foster chain development. Linkages can also be improved through matchmaking or improved contractual arrangements.

(3) Creating new or alternative links in the chain, e.g., linking local firms in developing countries to global value chains or linking to new, additional lead firms. The assumption is that by making a new link the value chain is able to enter into new and higher value-adding activities.

Box 37: Typology of Objectives for Value Chain Interventions



Source: The authors, based on Humphrey and Navas-Alemán, 2010

Reviewing the information from the diagnostics, the analyst should also be able to give suggestions on which mix of the four value chain intervention strategies above would make most sense. There are a number of recommendations that may aid in the design of any implementation strategy:

1. **Value chain development should be a joint effort.** Value chains develop on their own but policymakers, development agents and private companies can intervene in a way such that the development takes on a certain trait. But any effort to foster the development of a value chain must take its own limitations into account with respect to covering everything needed in developing the chain. Value chains are systemic in nature and intervening at one end may be useless without simultaneous interventions at the other end. Since it is not likely that one actor can spread its efforts to develop the chain broadly enough to cover all the different segments and issues, it is important to develop partnerships. Indeed, a partnership strategy often forms the basis for comprehensive development of a value chain.

2. **Projects should become an integral part of value chain development.** Many governments and donors like to provide incentives to development in the form of project interventions. Developing all aspects of a value chain in an integrated manner, however, usually surpasses the capacity and size of a traditional project. Therefore projects that contribute to value chain development should understand themselves as integral parts of value chain development and make sure they partner with those projects that address other development constraints in the value chain. Value chain diagnostics helps to understand how different projects fit into the entire value chain development strategy and may identify areas where projects are missing or ineffective.

3. **Private sector engagement is key.** Value chain development requires the commitment of those who supply, process and market. With few exceptions these actors come from the private sector. In fact, value chains can be considered as a set of private sector initiatives coordinated around the generation of an end-product, eventually benefiting from private and public support services. Support from public and development agencies may be substantial but cannot replace private sector activity in production, processing and trade. Private sector firms will be the ones taking market positions in the value chain, meaning they will buy and sell products. The operations they engage in will depend, to a large extent, on their own capacity and public support can only be a part of the incentive to engage in the business.

4. **Public support is vital.** The public sector has a crucial role to play when it comes to setting the right conditions and can provide some targeted services for value chains to flourish. It is therefore critical to engage the public sector in the planning of the diagnostics instrument, discussing also its potential use and benefit with regard to ongoing government interventions in the sector.

5. **Developing a value chain development and funding strategy is crucial.** Projects and donors may only be attracted to the development of a certain aspect of value chain development. However, without development of the entire chain, the parts

they are targeting will most likely not develop. It is therefore important that when trying to develop a certain part of a value chain, governments and donors do not ignore the development of other parts. In fact, there must be an integral strategy that specifies how financial and other support to the various parts of the value chain shall be provided. The strategy should also make sure that governments, donors and investors are attracted to those aspects of the value chain where development is missing.

6. **Priorities in value chain development should only be set if success can be assured.** Value chain diagnostics can lead to suggesting integrated value chain development that can become very costly, and those who aim at value chain development may want to prioritize interventions in light of limited budgets. However, the integrated (holistic) nature of value chain diagnostics can reveal the most important bottlenecks and opportunities in the chain where interventions may be most useful. Value chain diagnostics should also be viewed as an opportunity to point out that certain interventions will not be successful if other constraints are not resolved beforehand.

7. **Value chain development is a participatory process.** The diagnostic tool must be seen as input in a wider process of value chain development in which the various stakeholders engaged in and affected by its development must contribute to strategic options and their implementation. While the diagnostics can be carried out by a limited number of consultants, at minimum a multidisciplinary team, the development of strategies and their implementation requires a broad base of consultation and engagement.

8. **Acknowledge missing pieces of information.** The diagnostic tool suggests providing information on seven different areas and not compromising on one or the other (providing information on 4 out of 7 dimensions would only be a partial analysis). Given its broad framework, it can often occur that value chain diagnostics do not render the same depth and quality of information on all aspects of the chain. In this situation it is important to point out the lack of information and stress that the missing pieces will be covered in further analysis that will eventually be conducted in the planning and formulation of value chain interventions.

9. **The results of the diagnostics should be defended.** Those who risk being adversely affected by the results of the diagnostics, whether because they will receive less support or have less part in the implementation will try to place the validity of the results in question. Here it is important to refer to the broad diagnostic framework that is being used that includes all possible aspects of value chain development in an integrated manner. It is also important that the results be validated and discussed among stakeholders in order to be able to formulate strategies and implement interventions.

10. **Identification of sources of financing and technical assistance.** The sixth dimension deals with financing in the value chain. The analyst may also take this opportunity to identify public and private sources of funding and investors that may be interested in financing activities that contribute to value chain development. Meanwhile, in the other dimensions the analyst will find out about

technical assistance and institutional support that could benefit the value chain. Information will thus be generated through the diagnostics that can help bring important pieces of information into the formulation of value chain development projects.

11. **Setting up a chain development body.** In many countries there is already some type of chain coordination or chain development mechanism in place under the initiative of the public or private sector, where the various stakeholders in a chain meet. The diagnostics should take the existence and strength of such a body into consideration. Alternatively, there might be a lead-firm or individual champion that could further engage in fostering value chain development by drawing from the diagnostics.

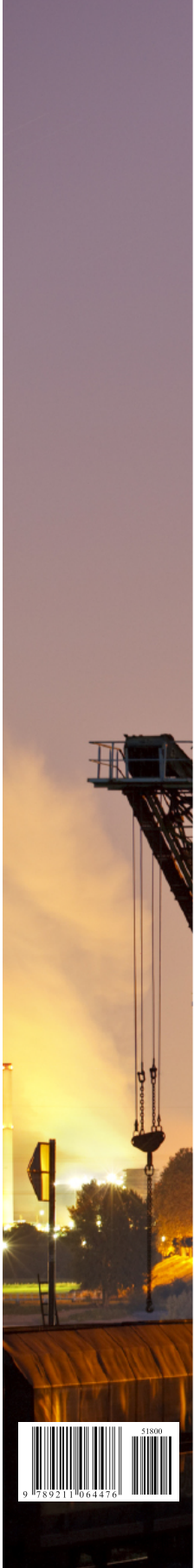
Resources for further reading

- Altenburg T. (2007) Donor Approaches to Supporting pro-poor Value Chains. Donor Committee for Enterprise Development. Working Group on Linkages and Value Chains. Available from www.value-chains.org
- Humphrey, J. and Navas-Alemán, L. (2010) 'Multinational Value Chains, Small and Medium Firms and 'Pro-Poor' Policies: A Review of Donor Practice'. IDS Research Report 63.Institute of Development Studies, Brighton
- USAID (2009). Participatory Approaches to Value Chain Development. Available from www.microlinks.org
- USAID (2010). Implementation Best Practices for Value Chain Development Projects. Available from www.microlinks.org

Industrial value chains comprise all activities required to manufacture goods by transforming primary materials and adding value to them, including primary production, supply of inputs, processing, storage, transport, quality control, marketing, and distribution. Promoting industrial value chains in developing countries is increasingly recognized as a promising approach to bring about economic development, create jobs and induce inclusive growth while also addressing a wide range of social and environmental development issues.

However, such promotion requires a sufficient understanding of the status of development in the value chain and the complex horizontal and vertical linkages among its actors and with the socio-political environment. Assessments that focus on a reduced number of points of entry to value chain development are not helpful and can contribute to repeated failure. What is required is an integrated approach that looks at the various segments and dimensions of the value chain simultaneously.

This guide assists analysts and decision makers to obtain a sufficiently complete picture (shot with a wide angle lens) of the status quo in a given value chain using rapid data collection and analysis methods. While not designed to replace in-depth methods for programme planning, this type of diagnostic helps focus on important constraints to and opportunities for value chain development that can be taken into consideration to ensure the impact of interventions. This type of diagnostic can be useful at any point of value chain development: in the beginning when choosing the value chain, during the analysis phase and later during implementation, monitoring and evaluation and adjustment.



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