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GENDER AND PRO-POOR VALUE CHAIN ANALYSIS:

INSIGHTS FROM THE GATE PROJECT METHODOLOGY AND CASE STUDIES

GREATER ACCESS TO TRADE EXPANSION (GATE) PROJECT UNDER THE WOMEN IN DEVELOPMENT IQC
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Yosef Hadar,1983/The World Bank

SUMMARY

The Greater Access to Trade Expansion (GATE) Project is developing a multi-pronged approach to provide development practitioners with an understanding of and the tools for addressing gender issues in value chain development programs. This suite of resources includes a methodology for conducting an economic analysis of gender in value chains, a handbook for practitioners to for addressing gender issues in the design, implementation, and monitoring of value chain development programs, and training materials on Gender and Value Chain Development.

This document presents the GATE Project's methodology for conducting an economic analysis of gender in value chains. The justification and the methodology for conducting a gender and pro-poor value chain analysis using a mixed-methods approach is outlined here. The guide discusses the key components of the analysis including the estimate of costs and returns, value added, labor market segmentation, and the analysis of power and the terms of exchange throughout the chain. This approach analyzes the chain from an economic perspective and is a tool for the analysis of specific value chains by shedding light on the opportunities to improve the terms and conditions of employment and exchange for poor men and women. The guide illustrates the methodology drawing on examples from the two GATE value chain analyses undertaken in Bangladesh for the shrimp sector and Peru for artichoke production. It also integrates findings from GATE research in Nigeria on the cowpea sector. A discussion of the potential of the approach to generate policy recommendations and the need for further work concludes the paper.



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WHAT IS A VALUE CHAIN?

"A value chain describes the full range of activities which are required to bring a product or service from conception, through the intermediary of production, delivery to final consumers, and final disposal after use" (Kaplinsky 2000).

The development of the concept of value chains and the study of these chains has expanded rapidly with the globalization of economies the production and distribution of goods and services can be conceptualized as a chain of activities and processes. The examination of value chains and their analysis and inclusion in economic development programs for their potential to increase economic growth and reduce poverty is more recent (Humphrey 2005). And identifying gender issues in and through value chains is even more recent.

An understanding of the position of men and women, and more specifically gender relations, is imperative to maximize knowledge of the totality of production, distribution, and consumption within an economy. Literature on value chains, while including some analysis of poverty, has largely neglected gender relations and inequalities. There is increasing awareness of gender dimensions, and particularly, gender inequalities, along

value chains. Recent empirical literature on gender and value chains reveals that there is increasingly a high incidence of women employed in one type of value chain: buyer-driven commodity chains. In these chains, female employment is most often concentrated in labor-intensive, low value-added activities. This "feminization" of labor is also marked by increased flexibility of employment, which allows employers to reduce wage and non-wage costs, such as social insurance and other benefits.

Gender differences are at work in the full range of activities that comprise a value chain. A gender approach to a value chain analysis allows for the consideration of groups and individual men and women's access to productive activities; differential opportunities for upgrading within the chain; gender-based division of activities; and, how gender power relations impact economic rents among actors throughout the chain.

Value chain analyses recognize that various configurations of actors may influence capabilities, possess different levels of bargaining power, and subsequently affect outcomes along the value chain. GATE integrates a gender and pro-poor analysis that aims to uncover the economic, organizational, and asymmetric relationships among actors throughout the chain and recognizes that power differentials among actors may influence outcomes along the chain. The GATE Project has analyzed value chains from a distributional perspective to explore opportunities to;

1. **Improve market outcomes,**
2. **Raise productivity and wages,**
3. **Decrease gender inequalities,**
4. **Foster pro-poor growth in the sector being analyzed.**

The distributional analysis explores the value added generated along the chain and examines the returns to labor and capital for the different actors participating in the chain. All data gathered and analyzed are intended to be disaggregated by sex in order to identify, from an economic perspective, returns to men and women for participating in the chain. Where possible we also examine the poverty rates and livelihood strategies of different actors in the chain.

METHODOLOGY OVERVIEW

GATE uses mixed-methods, which rely on primary data collection through surveys, secondary analysis of household survey and national accounts data, and qualitative analysis using key informant interviews and focus groups. Integral to GATE's gender and pro-poor analysis are the following components:

- Analysis of power and governance within the chain: investigates power within production and exchange relationships across the value chain, including the power to set market prices and bargain as well as indebtedness and sub-optimal contracting;
- Segmentation analysis: assesses how the labor market is segmented by sex throughout the value chain;
- Distributional analysis: explores the value added generated along the chain and examines the returns to labor and capital and to the different actors that participate in the chain.
- Entitlements and capabilities analysis: considers factors and characteristics that mediate men's and women's entitlements to productive resources, and their capabilities to deploy these resources. Where possible, GATE also examines the poverty rates and livelihood strategies of different actors in the chain.

DATA COLLECTION

What follows is an outline of the types of data required and the methodology for gathering these data.

1. Survey Instruments. Survey instruments are the primary means to capture information about the costs, rents and returns in the sector, inputs prices and their origin (domestic or imported),* types and amounts of labor, hours worked, wages and benefits, as well as socio-economic data on workers and producers, data on access to and the terms of credit, and output prices and the terms of exchange. The survey should be designed to capture a representative sample of all the actors in the chain including producers, workers, intermediaries, processors, and exporters.

2. Key informant interviews. These interviews should be undertaken to develop an overview of the sector and the key priorities and concerns, as well as opportunities for and challenges to chain expansion. A broad sample of the actors should be interviewed, not just firms and businesses, but government officials, union members, and non-governmental organization (NGO) representatives as well. Open-ended semi-structured interviews are best to explore these key questions.

3. Group Interviews. Group interviews can be conducted with small producers and workers to maximize the number of respondents. Whenever possible these interviews should be sex-segregated. The objective of the group interviews is to uncover the power dimension underlying the terms of exchange and the nature of the terms and conditions of employment in key parts of the chain. *A sample set of interview questions is provided in Annex 1.*

4. National Accounts Data. These data should be used to develop a macro overview of the sector and for the value added analysis. The type of data required includes data on exports (f.o.b) and imports† or other key markets, growth in the sector over time, and in similar sectors for comparison.

5. Labor Markets Data. If data are available on labor absorption and wages in the chain these are particularly helpful—although they may not be valid or sufficiently recent to provide an up-to-date picture of the chain. At a minimum, however, these data may be useful to benchmark estimates or provide additional information about the potential for employment generation.

6. Price data. While we are usually unable to analyze costs and returns in the global value chain, some insights can be gleaned from examining prices in key export markets—most notably the US. For example, data from United States Department of Agriculture (USDA), supermarkets or other retail outlets can be used to explore what proportion of the final price is captured by which actors in the chain and what accrues to interests outside the country.


Curt Carnemark,1996/The World Bank

*The domestic or foreign origin of the inputs is particularly important for any analysis of backward and forward linkages and multipliers.

†In the absence of data on freight and insurance from the exporters the difference between f.o.b. and c.i.f. figures will be particularly useful as a rough estimate to calculate that portion of value added that accrues to freight and insurance.

ANALYSIS OF POWER AND GOVERNANCE WITHIN THE CHAIN

MAPPING THE CHAIN

One of the first tasks to complete in the value chain analysis is a map of the chain which allows a tracing of the relationships between actors such as producers, intermediaries, processors and exporters and the flow of inputs, services, and credit through the chain. The map should estimate the number of firms involved in various functions and where possible provide estimates of employment in the chain.

Four general groups of actors can be seen in the Peruvian export market artichoke value chain in Figure 1: Input suppliers (agrochemical companies, banks, technical assistance providers, etc.), artichoke producers (farmers), processing units (processing plants/exporters and producer-processors-exporters), and marketing agents (transporters, brokers, and supermarkets). The various boxes and circles represent one or more organizational unit of varying complexity. The map of the value chain can indicate the type and size of these units graphically, and depict the flows of inputs, goods or services between the nodes.

The economic structure and other characteristics of groups of actors can be further analyzed to indicate the value-added, employment structure, etc. A value chain mapping can also be shaped to reflect salient

Figure 1. Artichoke Value Chain in Peru

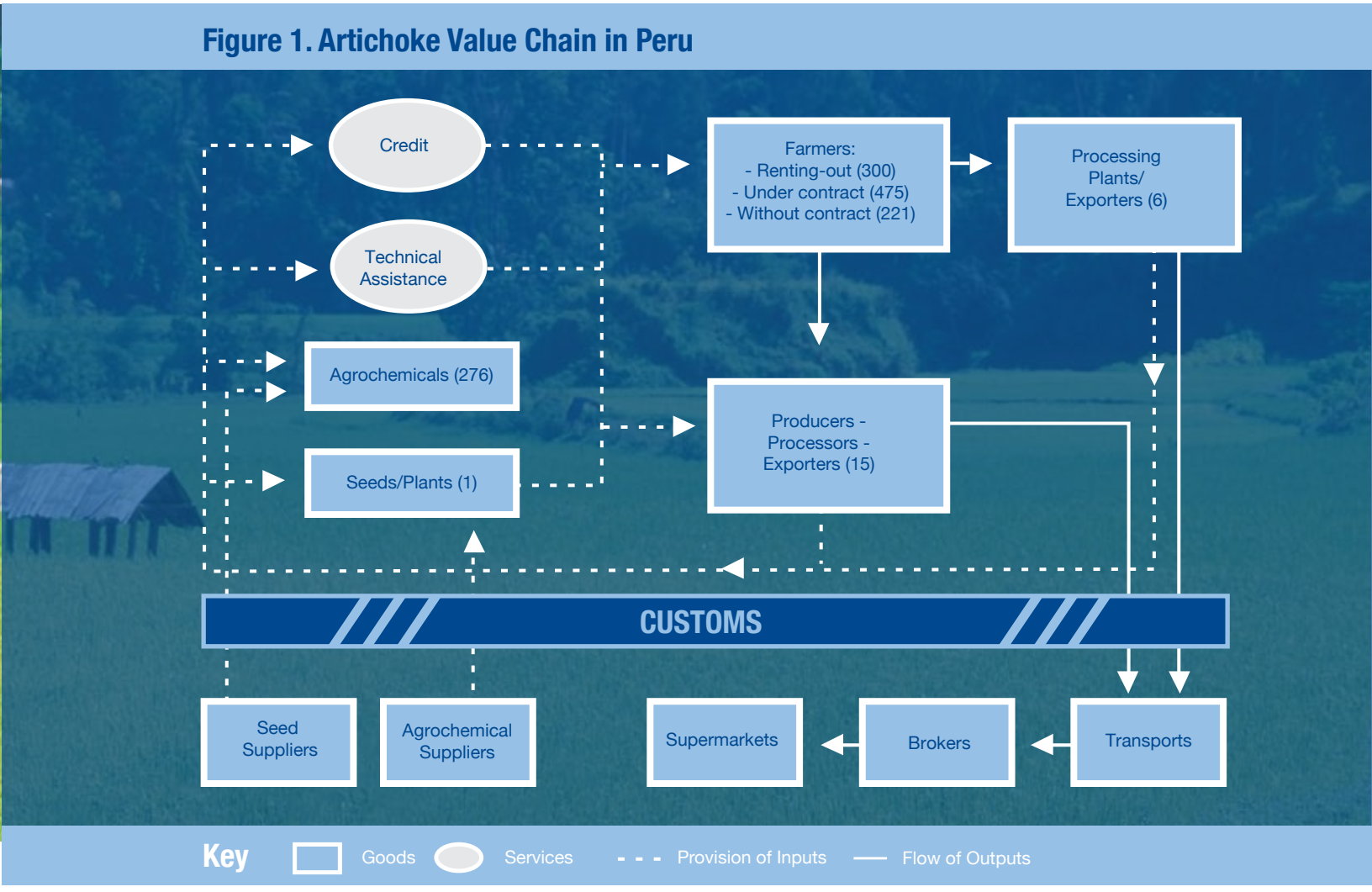


Figure 1 provides a schematic of the artichoke value chain developed by GATE in Peru which delineates the flow of goods and services through the chain within and across borders. Source: Rebosio et al. 2007. Photography by Curt Carnemark,1996/The World Bank.

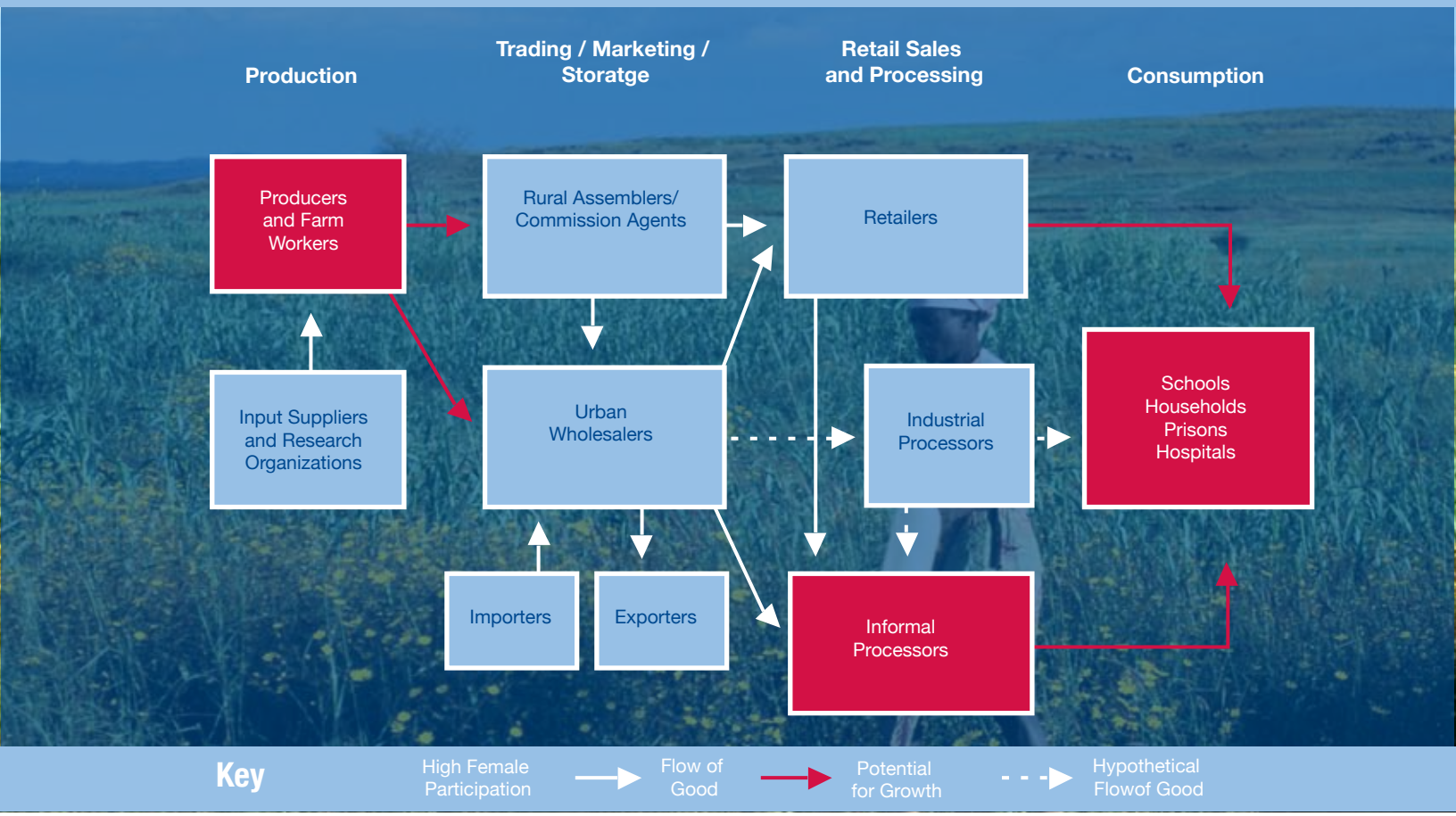
characteristics of production and exchange such as employment (total or by gender) or relative size by profit or return. Figure 2, a map for cowpea production in Kano, Nigeria, reflects the current convention to separate functions and operators, and shows another means to reflect gender information. Annex 2 provides some mapping conventions for illustrating gender information in value chain maps. A good map reflects significant analysis of the value chain.

GOVERNANCE AND POWER

The concept of governance in value chains, identified by Gereffi (ref), refers to the ability of key or "lead" firms to organize the activities along a chain and their ability to control the distribution of labor and resources within it. The discussion of governance started with a distinction between buyer-driven and producer-driven chains. In buyer-driven chains, the global buyers establish and control geographically-dispersed production and distributions systems often owned by others,[1] while in producer-driven chains, the key technology and production facilities (manufacturers) are controlled by the producers, typically in capital- and technology-intensive industries such as automobiles.[2] As global value chains in agriculture emerged in the 1980s and grew in the 1990s, most of them were classified as "buyer-driven," notably the horticultural value chains directed by supermarket companies in Britain and Europe that invested in smallholder production and packing plants in Africa, increasingly defining production and quality standards for crops such as green beans, snow peas, and cut flowers.[3]

As global value chains continued to evolve, becoming more complex, it was recognized that in practice, both types of governance processes could be encompassed in a single chain. For example, producer-driven chains were starting to sub-contract out the less profitable manufacturing tasks, while

Figure 2: Gender Roles in Cowpea Value Chain, Kano, Nigeria



Source: GATE 2008. Photography by Curt Carnemark,1996/The World Bank.

maintaining overall control of assembly, marketing, and branding. Recent typologies of governance include five different categories according to high or low levels of informational complexity, ease of codification of information, and supplier capabilities.[4]

POWER: MONOPOLY AND MONOPSONY

A value chain analysis can consider the dimensions of power and inequality along the chain. In economic terms, the analysis can explore monopoly and monopsony power to set market prices;* the power of bargaining between buyers and sellers, as well as, indebtedness and sub-optimal contracting. Uncovering the power dimension, as defined above, of value chains is not easy—but qualitative methods may provide indications of the inequalities in bargaining power and the role that larger firms and intermediaries play in determining the terms of exchange.

The shrimp value chain in Bangladesh illustrates the analysis of power within a value chain. In particular, in examining the exchange between producers and buyers, the lack of transparency in much of the sorting, weighing and grading process affects the sale price for shrimp. For example, the sale price is fixed based on the grades of shrimp and number per unit of weight. Few accurate measuring devices are used to assess size and weight for grading. It is typically a highly subjective grading process, where the party who exerts greater power over the other reaps the benefits. The shrimp faria (one of the intermediaries) tries to pay the shrimp farmer as little as possible for the shrimp in order to maximize the profits the faria earns when selling to the shrimp aratdar (another intermediary). Moreover, the shrimp farias and aratdars use relatively fewer grades compared to those prevailing in the export market—a tactic which tends to depress prices in the exchange and reduce the amount due to the shrimp farmer.

Shrimp faria also make loans to the farmers and may supply equipment and materials to the shrimp farmers including lime, fertilizer, fries, oil cake, and wood for making sluice gates, and bamboo for fencing and partitions. The farmer borrows from and sells directly to the shrimp faria. In turn the shrimp faria will have borrowed money from a commission agent and will be obliged to sell to that commission agent.

Qualitative data can be used to uncover the asymmetrical relationships and sub-optimal contracting that can prevail in any value chain and will provide important insights into how to improve the terms and conditions of employment and exchange for small farmers and workers in the chain. For example, improving grading technology and transparency in the sales process can shift returns toward producers.

In the case of artichoke farmers in Peru, it was clear that the contracting mechanisms posed an entry barrier for many small farmers. Livelihood concerns and the inability to bear risk meant that many small farmers were reluctant to shift from indigenous varieties of artichoke sold in local markets to the hybrid varieties produced for export. These farmers felt that there was much more risk involved in producing hybrid varieties which could not be sold on the domestic market. And, with hybrid production any variations in size and formation meant that their product would be rejected. This high degree of wastage implied significant economic losses for many small farmers. The lack of local credit sources meant that many processors were responsible for injecting credit into the chain—particularly in the highlands where small farmers were more actively courted for production. The resulting contracts were burdened with conditions about the sale of the produce as well as the recovery of the cost of inputs and credit advanced to small farmers.

> **"I have taken advance money [payment] from a commission agent. I sell 100 percent of my shrimp to him."** (Shrimp faria, Cox's Bazar, November 2005)

Attempts to overcome market failure and create enforceable contracts led to the creation of complex and burdensome contractual instruments that locked both processors and small farmers into sub-optimal arrangements. The restrictions on the use of inputs meant that frequently farmers waited for fertilizer and pesticides that did not come in time or cost more when they eventually arrived. In some cases, farmers broke their contract requirements on the exclusive sale of output and sold in the spot market. The qualitative data collected by the study on contracts proved essential to uncover shortcomings and to

* Monopsony describes a situation where there is only one buyer for a given product. A monopsonist acts like a monopolist determining prices and exerting power over sellers.

shed light on potential changes and modifications to these contracts that enable the more consistent and equitable participation of small farmers.

SEGMENTATION ANALYSIS

GENDER AND EMPLOYMENT IN THE VALUE CHAIN

The labor market analysis focuses on the terms and conditions of employment for men and women. A segmentation analysis provides another means of exploring power and inequality along the value chain. Sex segmentation in ownership or asset control could be examined, but this analysis focuses on labor market segmentation. For example, men and women have different tasks, roles, and responsibilities along the shrimp value chain, which is shown in greater detail in Table 2.

Measuring Sex Segmentation in the Labor Market

The labor market is frequently sex-segmented in almost all dimensions—men and women are not distributed evenly across sectors and occupations in proportion to their participation in the total labor force. A preliminary analysis of sex segmentation is a simple breakdown by sex of the number of workers in various organizational units. The prevalence of sex segmentation by unit can be easily read from the resulting table. The predominance of women in processing and men in transport in the artichoke value chain is obvious in Table 1.

A method of measuring segmentation for the entire value chain is by using the Duncan Index. The Duncan Index is calculated using the following formula:

$$D = 100 * \frac{1}{2} \sum_{i=1}^{N} | f_i - m_i |$$

The Duncan Index of Dissimilarity, ranging from 0 to 100, can be used to measure labor market segmentation by sex. An index of 0 indicates that the sectors or occupations are not sex-segregated and women and men are distributed across these sectors and occupations in proportion to their participation in the total labor force. An index of 100 indicates that men and women are in entirely different sectors or occupations. For example, the Duncan Index calculated for 10 sectors for the entire Bangladesh economy was 31 in 1990.* By 2000, this index had fallen to 27, registering a decline of over 10 percent in sex-segmentation over the decade of the 1990s.

The degree of sex-segmentation in terms of person days per year can be calculated along the value chain using the number of segments in the value chain. The analysis uses person days per year, since hours and shifts vary across the value chain and in different activities. The data should be collected for the different tasks and activities undertaken in the different segments of the chain. The person days can be summed for each of these activities and expressed as a percentage of the total person hours reported. Table 2 reports the segmentation by sex along the shrimp value chain in Bangladesh. The Duncan Index for hours worked is 62 indicating that the shrimp value chain is highly sex-segmented.* It is clear from Table 2 that women and

Table 1. Employment and Wages in the Artichoke value chain, September 2006

	Men	Women	Total	% F	% Informal	F/M Wages
Farmers	6,890	5,265	12,155	0.43	0.82	0.98
Small and Medium-Sized	1,923	711	2,634	0.27	0.85	0.88
Large	4,967	4,554	9,521	0.48	0.82	1.01
Processors	3,152	5,142	8,294	0.62	0.64	0.94
Transport	57	3	60	0.05	--	--
Total	10,099	10,410	20,509	0.51	0.75	0.96

Source: Rebosio et al. 2007.

* Employment in sectors is defined by two digit standard international classifications.

men cluster in different segments of the value chain and that their time is used unequally.

Implications of Sex Segmentation in Labor Markets

Analysis of sex segmentation is increasingly common and various trends have been identified. Women's absence in segments of particular value chains is frequently noticeable. Analysis of these trends can be found in other documents.[5]

In the shrimp value chain in Bangladesh outlined in Table 2, women are not active as intermediaries, nor are they visible in management in processing plants. Socio-cultural norms dictate and limit women's mobility and their freedom to engage in certain types of economic and productive activities. For example, women who cannot travel without male accompaniment (a socio-cultural norm found in Bangladesh) are unlikely to act as financial intermediaries and buy and sell shrimp or fry. Particularly interesting is their absence from shrimp farming, especially since farming is disproportionately undertaken by households operating shrimp farms as a family business. One explanation is that both women and men are likely to under-report women's labor in farming because it is seen as an extension of their household chores and not as a production input. A time allocation analysis conducted at the household level would likely uncover more women and children in farming activities.

Sex-segmented labor markets, disproportionate clustering of women and men in certain activities, and different use of time, is often a feature of norms

Table 2. Segmentation by Sex Along the Shrimp Value Chain

	Person Days Per Year			Female Intensity		
	Men(M)	Women(F)	Total	F/M	F%	Duncan Index
Fry Catcher	3721	2384	6105	0.6	39.0	
Fry Faria						
Fry Aratdar						
Shrimp Farmer	35028	786	35814	0.0	2.2	
Shrimp Faria						
Shrimp Aratdar	11650	183	11833	0.0	1.5	
Commission Agent	37	0	37	0.0	0.0	
Shrimp Nursery	600	0	600	0.0	0.0	
Shrimp Hatchery	6288	120	6408	0.0	1.9	
Transporter	127	0	127	0.0	0.0	
Retailer & Wholesaler	4	0	4	0.0	0.0	
Processor and Exporter	25790	42483	68273	1.6	62.2	
Shrimp Trawler	10	0	10	0.0	0.0	
Cargo Biman	50	0	50	0.0	0.0	
Input dealer						
Commission Agent(MS)	4	0	4	0.0	0.0	
Total	83,309	45,956	129,265	64.4	35.6	62.2

Notes: Data are estimates for survey area only. | Source: Authors' calculations using primary data, from Gammage et al. 2006.

* The Duncan Indices for the shrimp value chain and the economy as a whole are not directly comparable because one is calculated for employment and the other is calculated in terms of person days. Additionally, the number of sectors differs for the two analyses.

and expectations that limit the choices men and women can make as workers. If, as a result of segmentation along the value chain, women workers are more insecure and contingent, or more likely to be contracted under informal arrangements for lower wages, then it is also likely that these norms and expectations constrain both the choices made by men and women workers as well as their productivity.

Where women are seen as secondary earners whose income supplements men's earnings, they are more easily viewed as flexible and contingent labor. What is clear from much of the value chain analysis conducted by GATE and others[7] is that women are often disproportionately located in the more insecure nodes of the chain as seasonal or occasional labor in fry catching, farming, and processing. Where women's employment is flexible and contingent, they are also more likely to earn lower wages and be more vulnerable to poverty.


Cristina Manfre/dTS GATE Project

Flexible and contingent workers are often recruited by firms in global value chains to keep labor costs low and meet buyer demands. Women are often seen as flexible workers, hired to meet immediate production or processing demands and then let go, or required to work overtime to meet production schedules dictated by buyers or input availability.

Downstream Sex Segmentation: Consumers

Sex segmentation may exist in value chains in other dimensions than employment. A thorough gender analysis of a value chain will consider dimensions along the entire value chain. Downstream, toward the final consumer in the value chain, the commodification of products may depend upon trends in consumption that are linked to changing gender patterns of employment and women's higher labor force participation. As Barrientos (2001:83) observes: "Marketing companies adopt gender-based strategies in their campaigns to sell high value goods." This is the case with prepared foods such as salads, pre-washed, cut and packaged vegetables, as well as peeled and shelled shrimp and prawn. Even in the developed world, the responsibility for household provisioning still lies largely with women householders—many of whom are also working. A key element in marketing and sales strategies in higher income countries is to provide women householders with foods that can be easily prepared with the minimum expenditure of time and effort. Dolan and Humphrey (2004) observe that such strategies can maximize product placement and increase sales: Horticulture producers in Kenya earn high incomes by producing washed, packaged and chopped vegetables and salads, ready-packed and labeled for individual stores on short demand. Orders can vary up to the day of dispatch and production is virtually continuous.

Products are regularly differentiated by gender-specific marketing strategies. In some cases, women's involvement in production may be part of the marketing strategy. The Rwanda Peace baskets sold throughout the U.S. market women's role in the production process as an attribute of the basket. A gender or pro-poor analysis of global value chains should explore these dimensions throughout the entire chain.



Source: Rebosio et al. 2007. | Photography by Cristina Manfre/dts.

DISTRIBUTIONAL ANALYSIS

COSTS AND RETURNS IN THE CHAIN

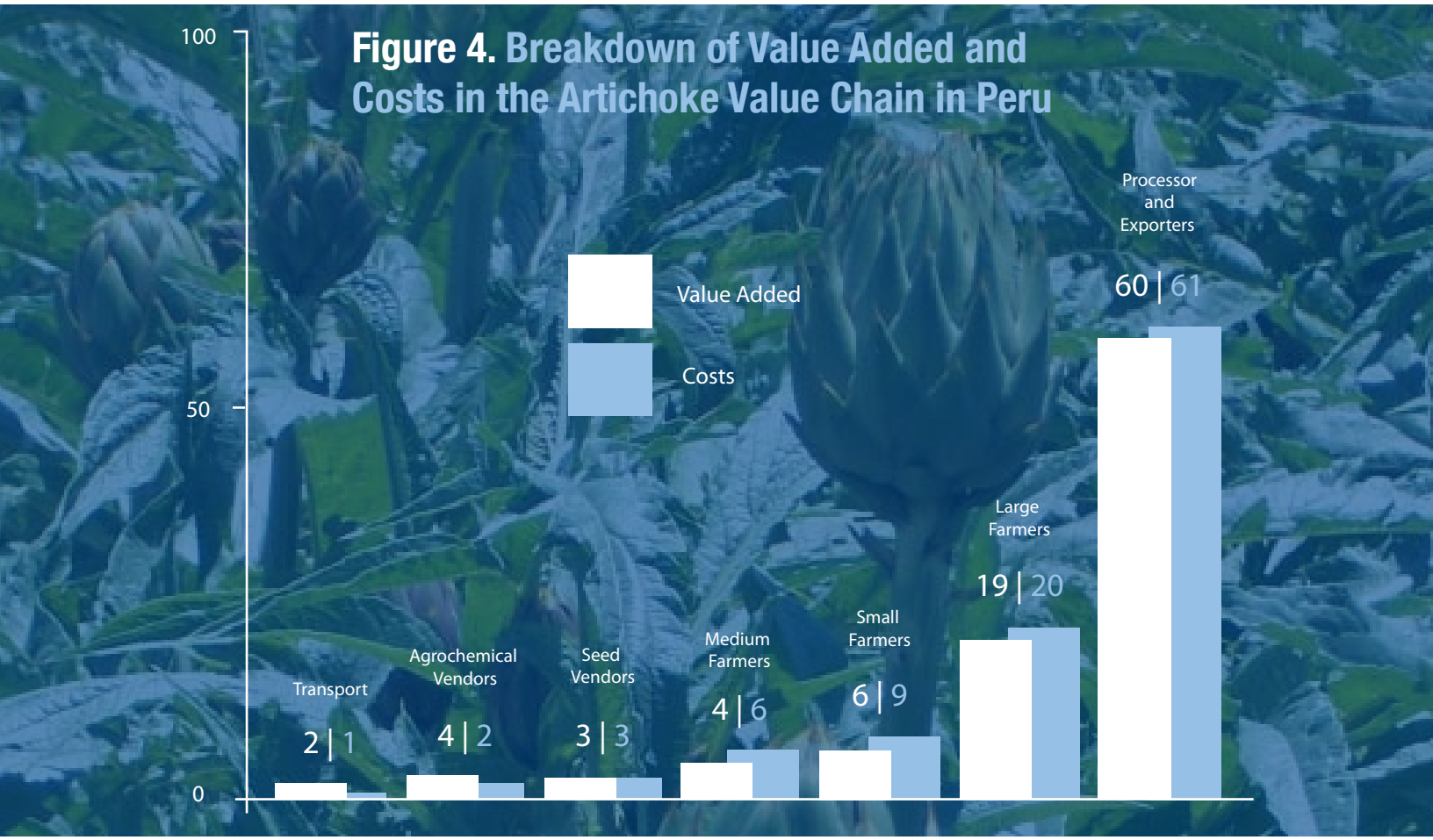
The analysis of costs and returns should be undertaken for each of the sets of actors to produce a rough estimate of the gross profit secured by each representative actor. The example of the Peruvian artichoke chain is used in Figure 3 to illustrate the analysis required for the different costs. The costs for processing artichokes were gathered from four processors and supplemented by data from the national accounts enabling a triangulation of the average costs of freight and insurance and seed imports. Figure 3 reports a breakdown of the variable costs of a representative processor in the sector.

The higher relative share of the cost of labor for artichoke processors provides an indication of the dynamics of labor relations. For other industries the basic inputs or transport might comprise the highest relative costs for the processor.

ESTIMATING VALUE ADDED

The analysis of value added is designed to capture the distribution of returns throughout the chain. The value added is the difference between the total revenue and the cost of bought-in (intermediate) raw materials, services, and components. The difference measures the value which actors have added to materials and services through a specific stage of production and/or processing.

The methodology outlined here does not give an exact breakdown of total value added, but rather an approximation based on the micro and macro data.



Source: Rebosio et al. 2007. | Photography by Cristina Manfre/dts.

In some cases it will be impossible to get good cost data from some actors, either because of recall and measurement error, or reluctance to reveal costs and earnings. The strategic and judicious use of macro and meso data will help to cover any gaps in the micro data. For large or strategic sectors there may be estimates of total value added in the national accounts. Additionally, the central bank may have an input-output matrix that captures value added. If not, other data will have to be used: for example, the returns to the exporters X_e should be the equivalent of the total exports, FOB, reported in the national accounts (see Table 3 for calculations).

Figure 4 provides a breakdown of the costs and returns in the artichoke value chain in Peru. It is clear from this analysis that processors capture most of the value added in the chain. However, processors also bear the greatest proportion of the costs incurred throughout the value chain.

Table 3. An Illustration of the Value Added Calculation

Actors	Costs	Returns	Value Added
Farmers	C_f	X_f	X_f-C_f
Intermediaries	C_i	X_i	X_i-C_i
Processors	C_p	X_p	X_p-C_p
Exporters	C_e	X_e	X_e-C_e
Total			**∑(X-C)**


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MULTIPLIERS AND SPILLOVERS

An analysis of multipliers and spillovers provides an estimate of the role that the sector plays in stimulating other economic activities. This analysis is important to understand the actual and potential contribution of the value chain to poverty reduction or stimulating economic growth. The methodology suggested here is based on the approach outlined in Miller and Blair (2003).

The first step is to gather information on the origin of inputs and the proportion of costs that are comprised of goods or services that are national or international in origin. Backward linkages represent the sum of all input purchases from other local and national industries by a particular sector expressed as a ratio of total sales, while forward linkages are the amount of purchases by other local industries from a particular sector.

These forward and backward linkages can also be derived from input-output matrices if these exist at a sufficiently disaggregated level. Linkages can be derived from the Leontief matrix constructed from input–output tables. In this case, the operational definition of a backward linkage is the sum of all a_{ij} row coefficients in a_j column of the technological A matrix in an input–output table (see Table 4). Forward linkages are the sum of all X_{ij} inter-industry sales of final demand for industry $_j$.

In many of the sectors in developing countries, it is unlikely that such highly disaggregated input-output tables exist, so it is necessary to derive estimates of forward and backward linkages directly from the survey micro-data and key informant interviews.

The multiplier analysis requires some simple coefficients derived from the backward linkages and the marginal propensity to consume. Multipliers measure the "ripple" effect in total national income of a unit change in some component of aggregate demand. They are frequently calculated as the ratio of the direct, indirect, and induced effects to the original direct change.

Typically, larger economies have larger multipliers because they are more self-sufficient than smaller economies. Larger regions also have larger multipliers. The goal of this analysis is to capture the extent to which the sector links to other economic activities and secures spillovers that stimulate aggregate demand in other sectors.

There are a variety of multipliers that can be calculated. Following Song et al.(2003), the most frequently used multipliers are those that estimate the effects of:

Table 4. Calculation of Forward and Backward Linkages in a Particular Value Chain

Actors	Inputs (%)		Linkages		Costs	Returns
	Local	Imported	Forward	Backward		
Farmers	L_f	M_f	F_f	$\sum_j L_{jf}/X_f$	C_f	XI_f
Intermediaries	L_i	M_i	F_i	$\sum_j L_{ji}/X_f$	C_i	X_i
Processors	L_p	M_p	F_p	$\sum_j L_{jp}/X_f$	C_p	X_p
Exporters	L_e	M_e	F_e	$\sum_j L_{je}/X_f$	C_e	X_e
Total						

1. changes in output of one sector on the rest of the economy;

2. income earned by households because of the new outputs;

3. the value added generated from the production of the new output; and,

4. employment that is expected to be generated because of the new output.

The focus here is on estimates of (1) and (4).

The first multiplier calculated is the ratio of the combined direct, indirect, and induced increments in income (attributed to the sector) to the initial direct increment in income. This is what Song et al. (2003) call a Type III multiplier.

Table 5 provides estimates of the multiplier effects in the artichoke value chain in Peru in 2006. The direct effects are those earnings generated from the production and processing of artichokes. The indirect effects are the payments for goods and services excluding wages to other sectors and suppliers. The induced effects are calculated as those payments for labor multiplied by 1/(1-MPC) where MPC is the marginal propensity to consume out of wages. The overall multiplier is then the ratio of the direct, indirect, and induced increments of income to the initial direct effects and is calculated as 1.82

The employment multipliers can be calculated as the total employment generated throughout the chain expressed as a ratio of the key inputs. For example, in the case of the artichoke value chain we estimate that approximately 3.1 jobs are generated per hectare of land given over to artichoke production.*

Table 5. Multipliers Effects from Production of Artichokes in Peru (Millions of US$)

Direct	Indirect	Induced
109.5	58.3	31.4
Multiplier = {(109.5+58.3+31.4)/109.5} = 1.82		

Source: Rebosio et al. 2007.

ENTITLEMENTS AND CAPABILITIES

In addition to the above analyses, the Sen (1999) framework examining an individual's or a group's "entitlements and capabilities" can also shed light on power and distribution within a value chain.

Entitlements describe the bundle of resources that an individual or group commands for the purpose of consumption, production, or exchange. These entitlements depend on the resources owned or available for use (including public goods) as well as on the conditions of exchange (such as relative prices, the type of market, and mode of exchange).

Capabilities summarize an individual's or group's freedoms and abilities to deploy their resources. An individual's capabilities refer to what Sen calls the alternative combinations of "functionings" that are feasible for him or her to achieve. Capability becomes a kind of freedom: the substantive freedom to achieve alternative combinations of functionings. A capabilities approach focuses less on the nature of the resources available to individuals or groups and emphasizes what they are able to do with these resources. The approach allows a consideration of how the dimension of power may influence an individual's or a group's ability to deploy their capabilities and improve the terms and conditions of employment or exchange.

The poverty or livelihoods analysis that is included in the value chain analysis should consider the entitlements and capabilities of the different actors and how those endowments affect their participation and benefits in labor markets, their access to productive resources, and their ability to negotiate improved terms and conditions of employment or exchange. A poverty analysis will focus primarily on incomes of various groups, particularly in relation to other actors in the value chain, national poverty levels, or in comparison to similar groups outside the chain. Box 2 shows some of the results of the analysis for Peruvian artichoke producers.

In analyzing the capabilities and entitlements of actors in the artichoke value chain, the farmers and laborers were identified as having low levels of entitlements and capabilities. Laborers are typically landless and small farmers were found to farm an average of 1 hectare of land. In the sample, 64 percent of landless laborers and 43 percent of all farmers had not completed

*These jobs are full time equivalents assuming 300 days per person per year in farming, processing, transport and packing.



secondary school. There was no significant gender difference in education levels for workers or between male and female farmers, though farmers with less land possessed less formal education (51 percent having not finished secondary school).

The opportunity to increase the benefits reaped by small producers in the value chain is currently limited by the fact that processors in the highlands make up only about 2 percent of the total value of exports (f.o.b.) within the chain. To date it is primarily these processors who have developed contractual arrangements with small and medium-sized producers. A generalized expansion of the chain will not necessarily translate into the increased involvement of small producers in the chain nor will it guarantee an improvement in small producers' income. Nevertheless, the agro-export model that has been developed in the highlands—where small farmers are linked to agro-processing through the provision of credit and technical assistance—has the potential to be used strategically to increase the participation of small farmers, upgrade their capabilities, boost local and regional economies, and reduce poverty.

Box 1. Poverty Measurements

The poverty levels of artichoke producers were estimated using household food expenditures per capita. Poverty levels of up to 70 percent were estimated for agricultural day laborers and 67 percent for small producers. Although the small producers and day laborers are poor, they are less poor than those engaged in growing other products. This reveals that the poorest of the poor have not been able to enter the artichoke value chain. A better understanding of the impact of artichoke production on poverty requires data on artichoke and non-artichoke producing farmers over time.

Source: Rebosio et al. 2007.



Francis Dobbs,1998/The World Bank

CONCLUSIONS AND RECOMMENDATIONS FROM VALUE CHAIN ANALYSIS

The types of conclusions and recommendations that emerged from the GATE Project approach to value chain analysis focused on how to improve the terms and conditions of employment and exchange for poor men and women in the chain. As a result, this guide presents a different approach to analyzing power, distribution, and segmentation in value chains, by income level and sex.

To date the GATE value chain analyses have demonstrated that the most vulnerable actors in the value chains occupy the least secure employment, and have limited opportunities to upgrade their production or change the terms and conditions of their labor and product exchange. Women are not visible in many activities even though their labor may be critical for particular nodes or segments of the chain. Women (and children) may be concentrated in the more flexible and insecure nodes of the value chain. Furthermore, insecurity in the chain is likely to be equated with low incomes and a greater vulnerability to poverty.

In order to increase the opportunities and benefits from trade, the GATE project has found that initiatives need to be pursued that raise productivity and improve production methods. Additionally, efforts need to be made to reduce indebtedness upstream at the production level and free-up producers to sell in local markets without being tied to lenders. In some chains, there is an excessive number of intermediaries. These intermediaries perform an important function injecting informal credit into a system that may face substantial credit constraints at lower levels of the chain and aggregating inputs and product over disperse geographical areas. Yet, the larger number of intermediaries is also illustrative of substantial inefficiencies in the sector. For example, indebtedness binds fry-catchers and farmers into sub-optimal contracts with intermediaries reducing their returns and depressing incomes. Additionally, significant loss or spoilage occurs as the fry or shrimp pass through multiple intermediaries before reaching the farm or processing plant.

One of the key findings from the value added analysis and the estimates of forward and backward linkages is the need to increase the density of these linkages to maximize spillovers thereby stimulating additional growth in the local economy. In the artichoke value chain, the analysis of the forward and backward linkages shows that while strong forward linkages from farmers to processors exist, there are fewer backward linkages to other sectors. The majority of inputs like seeds, packaging, and agrochemicals are imported. As a result, the linkages with the national economy are neither very dense nor very broad, a fact that limits the size of the multipliers and reduces the spillover effects. The analysis demonstrates that the actors with the greatest backward linkages in the value chain (small and medium-sized farmers) are also those that generally capture a smaller percentage of the total value added. Therefore, while there are denser links with the national economy lower down the chain, the spillover effects will not be as great. Clustering within sub-sectors, supporting the organization of small producer groups, and initiatives to promote local and national sourcing will increase the density of the backward linkages.

A first step toward increasing equality and reducing poverty levels is a complete analysis of the entire global value chain. This paper has outlined a methodology and provides a series of analytical tools that can be applied to reveal inequalities and power relationships along a value chain. These analytical tools can be used to develop context-specific program and policy recommendations. While largely descriptive, they illuminate key trends -and aspects of gender and economic inequality within the value chain and can be used to develop solutions that increase value-added, move poor men and women higher up the value chain and provide recommendations for key entitlements and capabilities that can be enhanced to achieve these outcomes.

These analytical tools can be used to develop context-specific program and policy recommendations.

A range of policy and program recommendations were identified for both Bangladesh and Peru that require the attention of governments, donors, development practitioners, private sector partners and other institutions. Few of the recommendations are within the sole manageable control of development agencies and their partners; the majority requires significant concurrence and cooperation of a wide range of stakeholders. These caveats do not undermine the importance of the recommendations rather they indicate that there is a need for targeted actions at different levels and careful, collaborative action with the full involvement of key stakeholders.

END NOTES

1 Citing Gereffi 1994 and1999 in Dolan and Sutherland, "Gender and Employment in the Kenya Horticulture Value Chain."

2 Ibid.

3 Dolan and Sutherland, "Gender and Employment in the Kenya Horticulture Value Chain."

4 Bolwig et. al, "Integrating Poverty, Gender and Environmental Concerns Into Value Chain Analysis: A Conceptual Framework and Lessons for Action Research;" and, Gereffi et. al "Introduction: Globalisation, Value Chains and Development."

5 Barrientos, "Gender, Flexibility and Global Value Chains;" Barrientos, Dolan and Tallontire, "A Gendered Value Chain Approach to Codes of Conduct in African Horticulture;" and, Dolan and Sutherland, "Gender and Employment in the Kenya Horticulture Value Chain."

6 Barrientos, "Gender, Flexibility and Global Value Chains."

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GLOSSARY

Aratdar

A Bangladeshi term for a commission agent or intermediary who buys and sells products. Fry aratdar typically buy shrimp fry from the fry faria and sell fry to the commission agent.

Downstream

Downstream in a value chain refers to the actors and operators toward the end consumption of the value chain product, i.e., the final market or consumer.

Duncan Index

A method of measuring segmentation. The Duncan Index is calculated using the following formula:

$$D = 100 * \frac{1}{2} \sum_{i=}^{N} | f_i - m_i |$$

Faria

Bangladeshi term for an intermediary who buys and sells products. Fry faria buy fry from catchers or hatcheries throughout the year. They sell the fry to an aratdar.

Input-Output matrix or model

A representation of an economy or region's economy used to predict the changes in one industry on others. Each column of the input-output matrix reports the monetary value of an industry's inputs and each row represents the value of an industry's outputs relating the output of one industry to the input of another.

Upstream

Upstream in a value chain refers to the actors and operators in early stages of the production of a value chain product, i.e., the origin of the value chain.

Value chain

A value chain describes the full sequence of activities (functions) which are required to bring a product or service from conception, through the intermediary of production, transformation, marketing, delivery to final consumers. A value chain can also include the final disposal after use.

Value chain actor

This term summarizes all individuals, enterprises and public agencies related to a value chain, in particular the value chain operators, providers of operational services and the providers of support services.

Value chain operator

The enterprises performing the basic functions of the value chain are the value chain operators.

ANNEX 1. EXAMPLES OF GROUP INTERVIEW QUESTIONS

This set of questions was developed for the gender and pro-poor analysis of the Peru artichoke value chain for interview with both men and women farmers.

Introduction: Short explanation of the purpose of the project and the objective of the questions. Note: The focus group questions are intended to be as neutral as possible and open-ended in order to stimulate discussion.

1. How are contracts made with the processors?
2. What is your opinion of these contracts? Would you change anything?
3. Is it better to work under contract or sell in the open market?
4. How do you negotiate the contracts with the processors?
5. Is it difficult to cultivate hybrid artichokes (thornless artichokes)?
6. Are the hybrid artichokes profitable?
7. 7. Do you think that cultivating hybrid artichokes gives you more income than cultivating other crops?
8. Is cultivating hybrid artichokes risky?
9. How easy is it to follow the guidelines and apply the inputs required by the processors?
10. Will you continue growing hybrid artichokes?

GROUP INTERVIEW WITH WOMEN FAMILY MEMBERS ENGAGED IN ARTICHOKE FARMING

These set of questions were designed to elicit information about women's role in artichoke cultivation and the division of labor between household and productive tasks.

1. Do you work on the artichoke plots?
2. What types of activities do you undertake?
3. How do you combine your work in the field with your other household activities?
4. Does it require a lot of work to grow artichokes?
5. Who else works in the fields growing artichokes?
6. Has growing artichoke increased your work on the farm and/or in the house?
7. Is growing artichokes profitable?
8. Do you think that cultivating artichokes gives you more income than cultivating other crops?
9. Do you see the benefits from growing artichokes?

ANNEX 2. CHECKLIST FOR A GENDERED VALUE CHAIN ANALYSIS

Analysis	Description	Indicators
Segmentation Analysis	Explore different measures of labor market segmentation by sex, race, ethnicity, migration status in different segments or nodes of the value chaine.	Feminization in each segment: (F/M) Duncan Index: $$D = 100 * \frac{1}{2} \sum_{i \neq}^{N} \mid f_i - m_i \mid$$ Permanent (p) and temporary workers (t) by sex. Fp/P, Mp/P; Ft/T, Mt/T Ft/(Fp+Ft); Mt/(Mp+Mt) Where Mp + Fp = P and Mt + Ft = T Informal workers by sex: applying the expanded definition of informality. Do workers in different segments of the chain, formal/informal, male/female, immigrant/native born, etc., differ by education, length of employment, or other measure of skills and abilities?
Governance and Power	Analyze bargaining power and governance along the value chain. Are there gender dimensions to governance? If governance is linked to the power of one firm or agent over another, is it also linked to feminization and "flexibilization" of employment?	• Number of buyers and sellers and their dispersion geographically. • The types of competition that prevail at different nodes of the value chain: monopoly, monopsony, cartels, imperfect or perfect competition, etc. • Extent of informality throughout the value chain. This can be measured in terms of the workforce, the number of firms, the-output of firms and the output in the national and global value chain • Extent of unionization along the chain by gender. • Indebtedness and the use of credit to tie sellers to buyers. • Autonomy: control over product definition, design, specification, source and type of inputs, etc. • Contracting: length of contracts, extent to which sale price is predetermined in the contracts. • Branding: the extent to which firms produce branded products. • Risk-bearing throughout the value chain. Who bears the risk of failure and how is it borne?
Entitlements and Capabilities	How are agents endowed with different entitlements and capabilities throughout the value chain?	Workers: do men's and women's different entitlements and capabilities affect where they locate as workers in the GVC? Are their terms and conditions of employment affected by these entitlements and capabilities? Firms: do firms face different entitlements and capabilities, differential access to credit, subsidies, infrastructure, government resources, training for their workforce, etc. Do these entitlements and capabilities vary by the nature of the enterprise – whether it is formal or informal or whether the workforce is formal or informal?

Notes: a The Duncan Index Where i = (1,2,...N) is the total number of sectors, industries, or occupations, and fi and mi are the sectoral employment ratios of men and women to their respective labor force. The Duncan Index of dissimilarity, ranging from 0 to 100, can

be used to measure labor market segmentation by sex. An index of 0 indicates that sectors or occupations are not sex-segregated; women and men are distributed across these sectors and occupations in proportion to their participation in the total labor force. An index of 100 indicates that men and women are in entirely different sectors or occupations.

ANNEX 3. INTEGRATING GENDER INFORMATION INTO VALUE CHAIN MAPPING

Mapping is a particularly helpful step in the process of analyzing gender roles and understanding differing gender participation and returns in value chains. Any value chain mapping can fairly easily be disaggregated by gender participation without overly complicating the map. At a minimum a disaggregation by gender participation should be conducted in all value chain analyses. However, a value-chain mapping exercise that uses gender roles and relationships as a starting point and intends to address gender inequalities should go beyond a disaggregation by participation to explore power, linkages, and relative returns. There are various steps to produce a successful engendered mapping of a value chain.

Identify key groups of actors in the value chain

The first step to examining gender relationships in value chains is to identify key groups of actors in the value chain, and more specifically, where women and men are located throughout the chain. As simple as the exercise is, it is rarely properly performed. The relative location of men and women throughout the chain can be identified by actors within the chain, indicating that either interviews or stakeholder participatory sessions may be of value. Men and women farmers can indicate the general activities conducted by each sex. (Figure M-1 shows a quick numeration of the relative roles of men and women in a value chain for maize in Kenya conducted with project staff).

It is important to examine the gender breakdown within each of the categories of actors of the value chain both upstream and downstream. A common deficiency of many gender analyses of value chains is the exclusive focus on the particular locations where women predominate. In some global value chains with origins in developing countries, women are clustered in production or processing activities depending on the nature of the value chain (e.g. horticulture). However, an initial mapping should attempt to capture both the absence of women as well as their presence. In fact, the absence of women probably indicates strong gender-constraints.

In an extensive mapping, the gender-segregation throughout the broader set of value chain actors can be mapped, including not just value chain operators, but also actors providing support to the value chain (referred to as the meso-level by GTZ ValueLinks). For example, in an agricultural value chain, agricultural extension agents support production, however, are integral to the competitiveness of the value chain. The absence of female agricultural extension workers may be a significant constraint to the upgrading of an agricultural product in some areas.

It is also important to clearly disaggregate each category of actor and institution by location of men and women. Particularly in processing or intensive production industries, the different categories of labor and management should be disaggregated. In some industries, specific labor categories are highly gender-segregated.

Collect data (on each gender group of actors).

An initial value chain mapping is based on the results of a data collection process reviewing existing information on the actors, products and markets involved in the value chain. The following questions should be answered for the relevant project:

1. **Labor allocation.** What work does each do? Make notes about any formal or informal restrictions on men's and women's work that relates to gender.

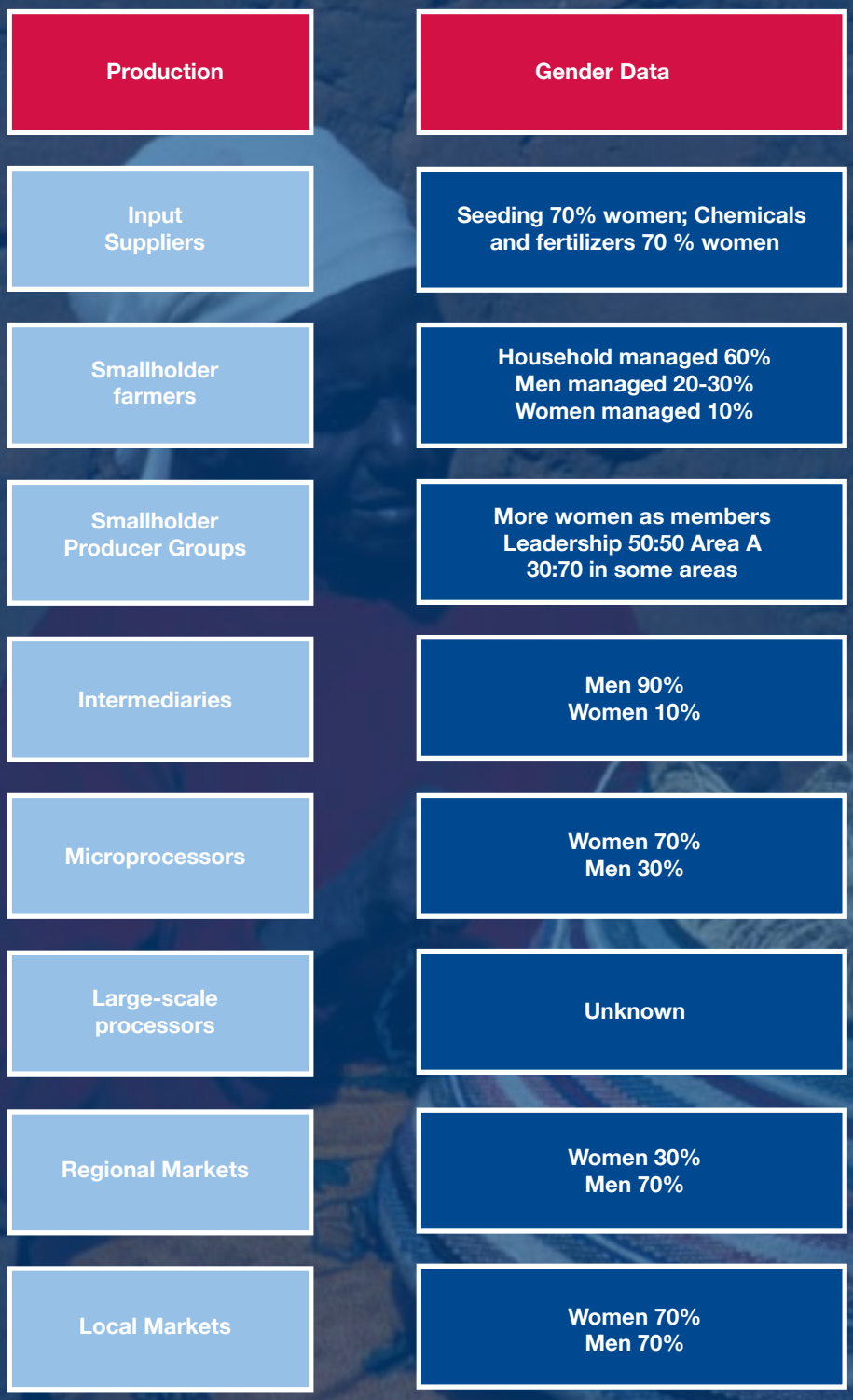
2. **Labor positions.** What positions do men typically occupy within firms or associations? What positions do women occupy within firms or associations? What are the criteria used for promotion and retention, and are these different for men and for women?

3. **Labor returns.** Do men and women earn different wages, collectively or by position?

4. **Ownership.** Identify women-owned enterprises within the chain.

Precise breakdowns of numbers and activities by gender may require more intensive interviewing and surveys depending on the complexity of the value chain.

Figure A-1: Initial Mapping of Gender Participation in a Maize Value Chain, Kenya



Calculate appropriate statistics on gender participation and roles

At the mapping stage, a gender breakdown in percentages of numbers by labor/management category is sufficient to indicate important areas of segmentation and gender constraints. However, statistics such as the Duncan Index to indicate segmentation in various parts of the chain can be calculated. Relative wages could also be integrated into the map by adding numbers to boxes. But the clarity of the map should be given priority.

Define mapping symbols and generate map

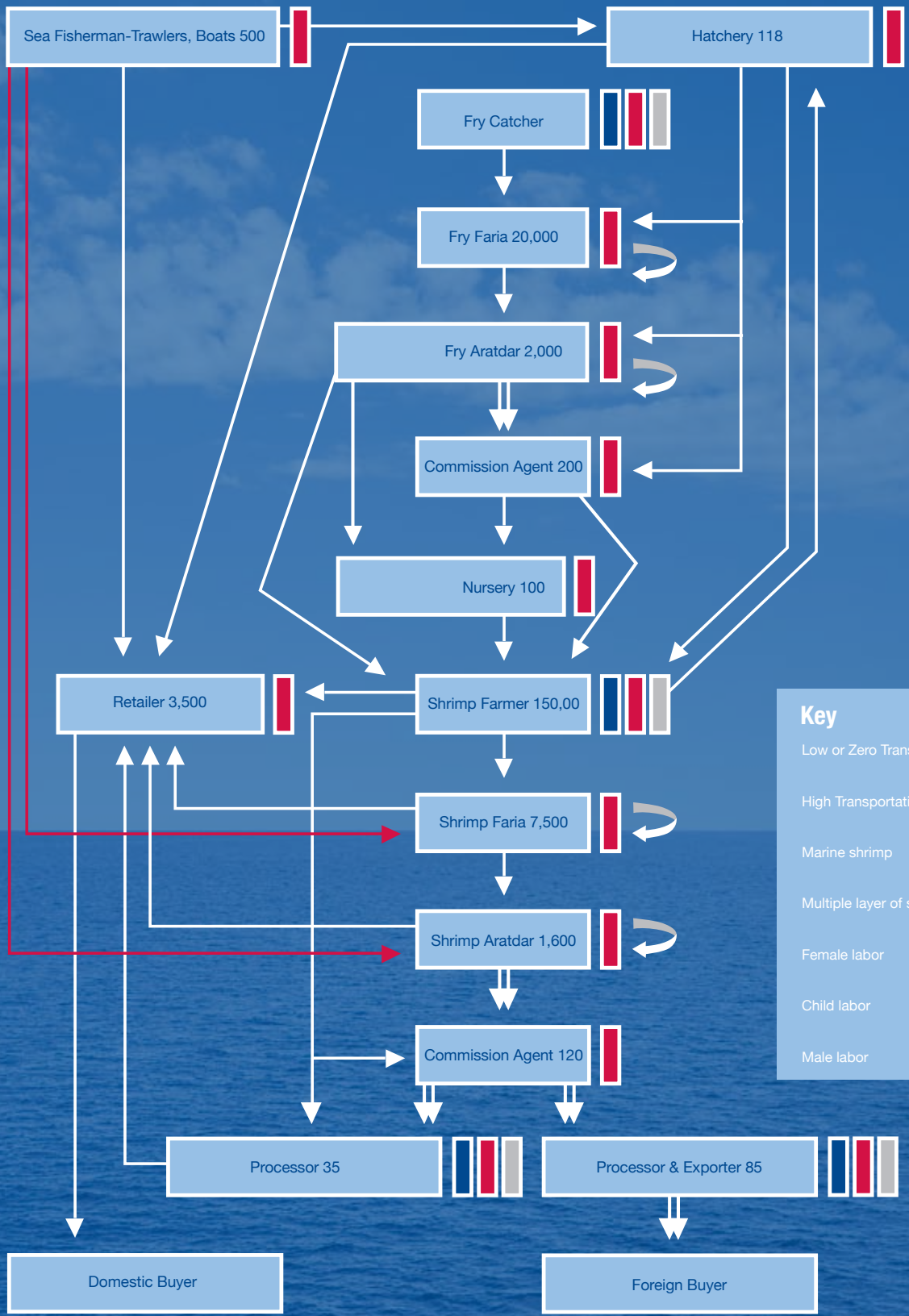
There are multiple ways of presenting value chain maps. Clarifying mapping symbols assists in clearly presenting value chain information. The map should distinguish between functions and actors/operators, and between stocks and flows.

Some common value chain mapping conventions and symbols have developed. In general maps are presented horizontally from the left (upstream from product origin) to the right (downstream to the final consumption point), but a vertical map may be used. Boxes, or squares, are usually used to represent value chain actors and arrows represent relations between the actors. Most important is a clear legend to indicate what symbols represent.

Gender relations have been integrated into mapping several ways. Colors can be used to represent where women have a strong role, as in Figure 2 in the text. Alternatively each box representing an actor can be divided into separate colors or other divisions representing percentages of men and women. Or numbers can simply be typed into the box describing the division by sex. Figure A-2 provides an alternate model to that in Figure 2 in the text.

Photography by Curt Carnemark,1996/The World Bank.

Figure A-2. Actor Based Marketing Flow Chart of Participants/Firms in Bangladesh Shrimp Industry



Note: For the sake of simplicity, the feed system is not addressed explicitly in this diagram. Feed enters the value chain through a variety of mechanisms from fish caught in inland waters that are ground into meal, snails that are gathered and sold to intermediaries and farmers, through feed mills, and from in home-produced inputs that are combined from fin-fish, wheat bran, rice bran, and oil cake.

Source: Gammage et al. 2006.



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