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Value chain development for green jobs in Asia

Volume II: Operational guide

Regional Office for Asia and the Pacific

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Foreword

Recent decades have witnessed an increasing recognition of the urgent need to decouple economic growth and improvements in material well-being from environmental degradation and the overexploitation of natural resources.

In response to this, the International Labour Organization (ILO) has developed the concept of green jobs, broadly defined as direct employment in economic sectors and activities which reduces their net environmental impact and ultimately reduces it to levels that are environmentally sustainable.[1]

The Green Jobs Initiative supports a concerted effort by governments, employers, and trade unions to promote environmentally sustainable jobs and development in a climate-constrained world. It seeks to facilitate a just transition that reflects the environmental, economic and social pillars of sustainable development. The development of this initiative has highlighted the need within the ILO for an update of its existing value chain development methodologies to better incorporate environmental sustainability issues.

Building on the ILO's extensive experience in pioneering value chain approaches to development, this guide will outline a framework for integrating the conventional, market-focused approach to value chain development with an assessment of the environmental and social outcomes generated by a given sector, with the aim of promoting employment that is environmentally, socially and economically sustainable. *Volume II: Operational guide* will provide further practical tools and guidance to assist in the implementation of green jobs value chain development initiatives.

Regional Office for Asia and the Pacific

[1] Developed in concert with the United Nations Environment Programme (UNEP), the International Organization of Employers (IOE) and the International Trade Union Confederation (ITUC).

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Abbreviations

CDM	Clean Development Mechanism
CFC	chlorofluocarbon
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DOE	designated operational entity
ETS	Emission Trading Scheme
FTE	full time equivalent
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potention
HFC	hydrofluorocarbon
HML	High/Medium/Low
ILO	International Labour Organization
IOE	International Organization of Employers
ISO	International Organization for Standardisation
ITUC	International Trade Union Confederation
kcal/kg	kilocalorie per kilogramme
KeTTHA	Ministry of Energy, Green Technology and Water
kWh	kilowatt-hour
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory
MYR	Malaysian Ringgit
N_2O	nitrous oxide
Pb	lead (plumbum)
PFC	perfluorocarbon
PM	particulate matter
PPP	purchasing power parity
PO_4^3	phosphate
R&D	research and development
RSPM	respirable suspended particulate matter

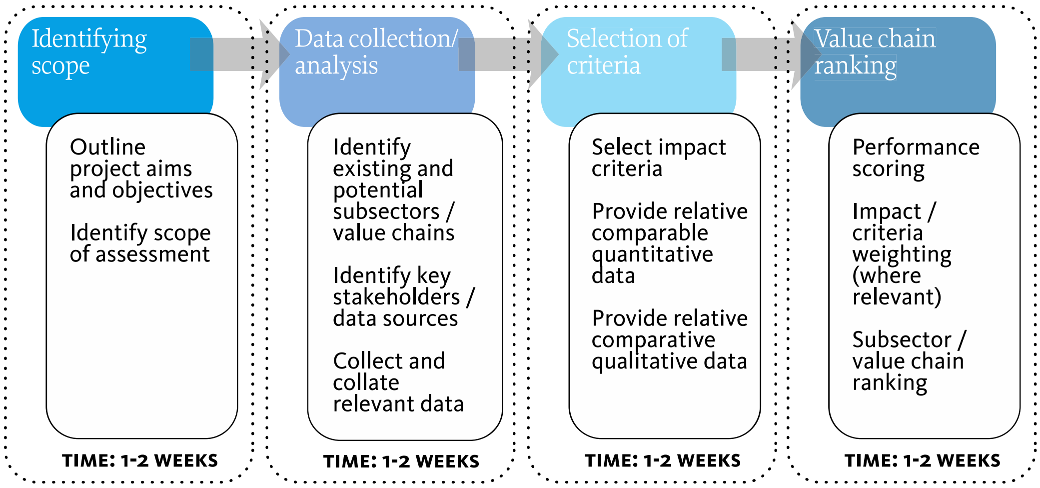
SDC	Swiss Agency for Development and Cooperation
SF6	sulfur hexafluoride
SHG	self-help groups
SME	small and medium-sized enterprise
SO_2	sulfur dioxide
SPM	suspended particulate matter
TERI	The Energy and Resources Institute
TSP	trisodium phosphate
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
UV	ultraviolet
VOC	volatile organic compound
VSBK	Vertical Shaft Brick Kiln
VSBP	Viet Nam Sustainable Brick-making Project

Introduction

Value chain development for green jobs in Asia – Volume II: Operational guide provides further practical tools and guidance to assist in the implementation of green jobs value chain development initiatives. These are intended to outline the key steps specific to the green jobs value chain development approach, and should be used in conjunction with internal project management systems and processes, and other external value chain development methodologies and tools.

This document follows the same structure as *Volume I*, with four sections covering sector selection, value chain mapping, analysis and intervention design, and intervention monitoring and evaluation. A case study section then provides information and learning outcomes from two existing green jobs-related development projects.

Section 1. Sector selection



1.1 Sector selection criteria

The criteria used for sector selection need to be seen in the overall context of a value chain initiative: they serve as an orientation for value chain research (see Section 4), focusing on key issues within a value chain system that the value chain research and analysis phase will subsequently investigate in greater detail. They also set the foundation for monitoring and evaluation during the implementation of interventions, providing potential indicators against which to monitor progress. For further details on the role of sector selection in the overall appraisal process, please see Section 5 (implementation, monitoring, and evaluation).

1. Global environmental impact

Below are outlined suggested indicators for global environmental impact. In addition to emissions to air, projects may also wish to take account of global environmental impacts generated by other aspect categories where relevant, including emissions to cross-boundary water bodies, land-use change and degradation with cross-boundary implications, and threats to internationally important habitats and species.

Table 1. Global environmental impact

Aspect[2]	**Indicator**
Emissions to air	Greenhouse gases (GHGs) (e.g. CO^2-eq.)
	Ozone-depleting gases (e.g. CFC $_{11}$-eq.)
	$SO_x/NO_x/NH_4$ (e.g. sulfur dioxide equivalent (SO_2-eq.))

2. Local environmental impact

The following table outlines suggested indicators for local environmental impact across five principal aspect categories. As with the global environmental impact indicators outlined previously, the following sub-criteria and indicators are not exhaustive, and should be used selectively (and supplemented where necessary by further project-specific indicators) according to the specific requirements of the project.

[2] The *Value chain development for green jobs in Asia* guide adopts the following definition of environmental impacts and aspects from the International Organization for Standardisation (ISO) 14000 standard:

- environmental aspects: elements of an industry's activities, products or services which can interact with the environment (e.g. wastewater discharges, air emissions, resource consumption, energy usage, ecosystem alterations, etc.);
- environmental impacts: any change to the environment, whether adverse or beneficial, wholly or partly resulting from an industry's activities, products, or services (based on the aspects: for example, air emissions impact the air by degrading air quality).

Table 2. Local environmental impact

Aspect	Indicator
Resource use	Energy use (MJ)
	Energy use (source) (relevant unit)
	Land use (m^2)
	Water use (m^3)
	Other resources (renewable) (relevant unit)
	Other resources (non-renewable) (relevant unit)
Emissions to air	Particulate matter (PM) (e.g. TSP/PM10/PM 2.5) (mg/g)
	Volatile organic compounds (VOCs) (mg/g)
Emissions to water	Compounds of P, K and N (e.g. phosphate equivalent (PO_4^{3}-eq))
	Toxic chemicals (e.g. pesticides, herbicides) (mg/g)
	Heavy metals (e.g. Pb) (mg/g)
Emissions to soil	Toxic chemicals (e.g. pesticides, herbicides) (mg/g)
	Heavy metals (e.g. Pb) (mg/g)
Solid waste generation	Biodegradable (kg)
	Non-biodegradable (kg)
	Hazardous (kg)

3. Decent work

The following table sets out a range of potential decent work indicators (grouped under the different elements of the International Labour Organization (ILO) Decent Work Agenda) for use both in the sector selection process, and during the research and implementation phase. As with the environmental impact criteria, the individual indicators used will be determined by a range of factors including data availability, resource constraints and the aims and objectives of the intervening organisation.

At a country level, these should be correlated to the greatest extent possible with the priorities outlined in the relevant Decent Work Country Programme, which are negotiated between the ILO and its constituents (government, employers and unions), and which provide an orientation for projects as to which selection criteria match best with a country's Decent Work Agenda.[3]

[3] ILO: *Decent Work Country Programmes*, Geneva, 2013, http://www.ilo.org/public/english/bureau/program/dwcp/ [accessed 29 Nov. 2013].

Table 3. Decent work selection criteria

Decent Work Agenda element	Indicator
Adequate earnings and productive work	Average hourly wage (local currency)
	Average hourly real wage (US$, corrected for purchasing power parity (PPP))
	Minimum wage as % of median wage
Decent hours	Average hours worked per week
	% of workforce working more than 48 hours per week
Combining work, family and personal life	Provision and status of employee accommodation and other employer-provided facilities (especially for migrant labour) (where relevant)
	Provision and status of employee childcare facilities (where relevant)
	% of workforce eligible for paid leave and/or sick leave
Work to be abolished	Number of child workers (<15 years)
	Number of child workers (<15 years) engaged in hazardous activity
Stability and security of work	% of workforce employed on formal contracts
	% of workforce employed on daily labour basis
Equal opportunity and treatment in employment	% female share of employment
	Average gender wage gap
Safe work environment	Occupational injury rate, fatal (per 1,000 hours)
	Occupational injury rate, non-fatal (per 1,000 hours)
	% of workforce covered by occupational health insurance
Social security	% of workforce covered by (basic) health care provision (public/private)
	% of workforce covered by pension provision (public/private)
Social dialogue, workers and employers' representation	% of employees belonging to labour union/other collective organisation
	% of enterprises belonging to employer organisation
	% of enterprises covered by collective bargaining
Economic and social context for decent work	Labour productivity (unit value added per employed person, local currency)

4. Green growth

The table below outlines a number of questions to be considered for evaluating the implementation of green growth plans and strategies in the sector selection phase. The questions are not exhaustive: further criteria will be determined in part by country context, the initial project parameters identified by the organisation, the proposed division of responsibility between the intervening organisation, contracted individuals and organisations, and partners.

Table 4.Green growth selection criteria

Green growth element	Questions
Increasing resource efficiency	Has the organization benefitted from efforts to improve resource use and environmental practices, as evidenced by gains in productivity and competitiveness?
Green product and service eco-innovation	Is the organization involved in producing products and services which reduce environmental risk and/or minimize pollution and resource use? Has the sale of green goods and services led to improved market share in domestic and export markets?
Green certification accessing new markets	Compliance with green certification systems— are there environmental labels and standards applicable to the value chain (and wider sub-sector), and does the organization meet the relevant requirements?
Green business development services and finance	Is the organization able to access public or private business development services/financing institutions which provide assistance with improving environmental performance?
Green rules and regulations	Have green rules and regulations created a supportive environment for the implementation of sustainable enterprise initiatives on the part of the organization? Further evaluated through governance mapping exercise (indicated below)

5. Livelihood generation/economic growth

Tables 5 and 6 provide a (non-exhaustive) list of potential indicators for current and potential livelihood impacts. Ideally performance data for selected indicators should be captured for a significant time series (although, as with other elements of the sector selection process, this may be subject to data availability and resource constraints). Where specific target groups/forms of organisation have been identified, and where information is available livelihood impact can also be assessed on a differentiated basis.

Alongside a quantitative appraisal of a sector's development trajectory, potential livelihood impact appraisal should also include a qualitative assessment of predicted changes in both demand and supply dynamics - these may include changes in scale and technological/capital intensity, new production norms, changes in demand through changing consumption patterns and increasing access to/development of new markets, and changing national and international regulatory environments. Alongside overall sector growth, capturing a greater percentage of total value within a value chain is the other route for improved livelihoods among target groups. Where possible, consideration should therefore also be paid to the distribution of benefits within a given industry, and potential opportunities for redistribution of these benefits.

Table 5. Current livelihood impact selection criteria

Current livelihood impact	Potential indicators
General	Number of people employed Contribution of sector to total (national) employment Contribution of sector to total (regional) employment Average income generated from sector participation (see also DW) Contribution of sector to gross domestic product (GDP) (national) Contribution of sector to GDP (regional) Labour productivity within the sector (see also DW) Functional division of labour within the sector (see also DW) Terms of employment within the sector (see also DW)
Target group/organisation specific	Number of target group employed Sector employment as % of total target group employment Average target group income generated from sector participation (see also DW) Target group segregation within the sector (see also DW) Target group terms of employment within the sector (see also DW) MSE participation in sector MSE employment as % of total employment Cooperative participation in sector Cooperative employment as % of total employment
Market specific	For all primary market channels: Size of market (by value) Scale of demand (domestic, regional or international) Market share (domestic, regional or international if applicable) Market as % of total sales Current market competition (if applicable) Current substitutes (if applicable) Current price/income elasticity of demand (if applicable)

Table 6. Potential livelihood impact selection criteria

Potential livelihood impact	Potential indicators
General	% change over previous 5 years in: Number of people employed Contribution of sector to total (national) employment Contribution of sector to total (regional) employment Average income generated from sector participation (see also DW) Contribution of sector to GDP (national) Contribution of sector to GDP (regional) Labour productivity within the sector (see also DW)
Target group/organisation specific	% change over previous 5 years in: Number of target group employed Sector employment as % of total target group employment Average target group income generated from sector participation (see also DW) MSE participation in sector MSE employment as % of total employment Cooperative participation in sector Cooperative employment as % of total employment
Market specific	For all primary market channels, % change over previous 5 years in: Size of market (by value) Average selling price (retail) Market share (domestic, regional or international if applicable) Market as % of total sales For all primary market channels, substantive change in: Scale of demand (domestic, regional or international) Current market competition (if applicable) Current substitutes (if applicable)

5. Technical feasibility

Table 7 outlines a number of questions to be considered in assessing internal and external technical feasibility issues within the sector selection process. Project technical requirements may include measurement and assessment of a range of environmental and decent work impacts during assessment, intervention and monitoring and evaluation stages, and the technical ability to create and operate a pilot demonstration unit to develop, test and assist in the dissemination of new, cleaner technologies and processes. These are determined in part by the initial project parameters identified by the organisation, and the proposed division of responsibility between the intervening organisation, contracted individuals and organisations, and partners.

Table 7. Technical feasibility selection criteria

Technical feasibility	Questions
Internal	Does the organisation have internal technical expertise on the wider industry or sub-sector in question, and the individual value chains being assessed?
	Does the organisation have technical experience of implementing specific technical solutions or packages within a given industry?
	Does the organisation have the capacity to provide (or otherwise contract) long-term technical support and training for technological upgrading, or does it intend to rely on existing or potential market participants to provide the necessary technical services (in the case of contracting or partnership see external feasibility)?
External	Maturities of relevant technologies — are there existing generic or sector-specific technologies offering clear benefits being deployed elsewhere?
	Capital and labour intensities of current and potential technologies - do these technologies match the factors of production in the country or region in question?
	Receptivity to technical change — has the value chain (and the wider sub-sector) demonstrated receptivity to technical change, including adoption of new technologies and processes?
	Do actual or potential partner organisations have the capacity to provide long-term technical support and training for technological upgrading?
	Local availability of relevant technologies and associated support – do supporting markets and service providers exist for potential technical interventions in the sector considered?
	Does the wider enabling environment required for technical upgrading (including for example sufficient physical infrastructure and an enabling policy and socio-economic environment) currently exist?

6. Organisational feasibility

The table below outlines a number of questions to be considered in assessing internal and external organisational feasibility issues within the sector selection process. The mandatory selection criteria include both financial and managerial aspects of a potential value chain initiative, and also the wider enabling conditions within a value chain or sub-sector. Note that within the external organisational feasibility category it is important to differentiate between strategic programme partners and implementation partners.

Table 8. Organisational feasibility selection criteria

Organisational feasibility	Questions
Internal	Does the sector match with your organisations' objectives and priorities?
	Does your organisation have previous experience in the sector and/or sub-sector? What human resources will be required to start a value chain initiative in the sector? Does your organisation have the necessary human resources capacity required to start a value chain initiative in the sector, or will this require assistance from partners/contractors? What financial resources will be required to start a value chain initiative in the sector? Does your organisation have the necessary financial resources capacity required to start a value chain initiative in the sector, or will funding partners be required?

	If external human resources are required (including contractors and partner organisations), are these available and sufficient?
	If funding is required from external partners, is this available and sufficient?
	Do effective organisations (including labour and employer's organisations) exist through which value chain participants can be engaged?
External	Receptivity to change — do stakeholders in the sector have the motivation/interest to change? Is there a strong partner organisation in the sector with which you can cooperate and that could potentially drive forward change?
	Are there existing value chain initiatives/other national and international development organisations operating in the sub-sector, and do they adequately cover the sub-sector?
	Does a wider business-enabling environment (infrastructure, policy and socio-economic environment) currently exist in the country or region in question?

1.2 Value chain ranking

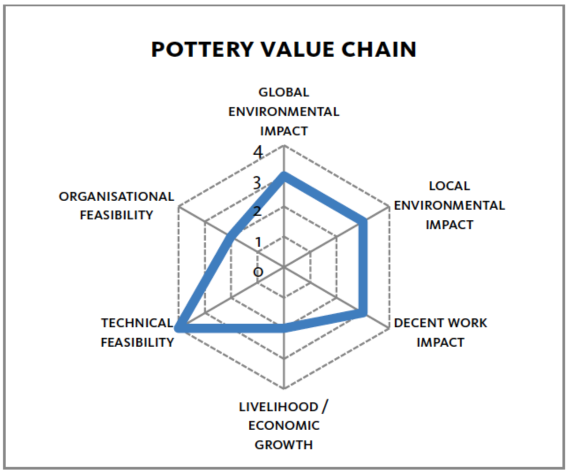
Example

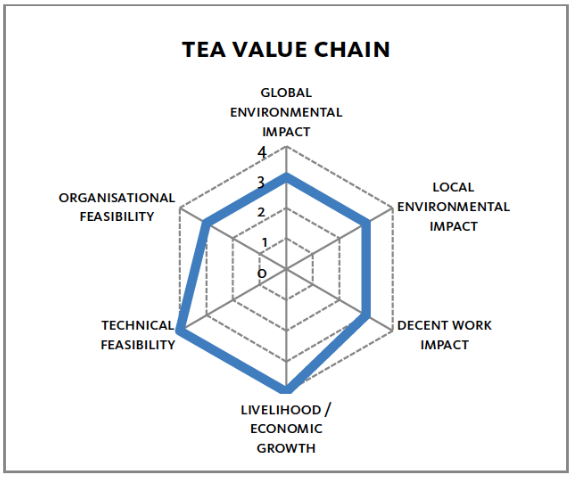
For reference, below is provided a hypothetical example of an unweighted ranking and selection example using the five point scale (0–4), applied to four different value chains (pottery, dairy, plastics recycling and metal casting). Individual criteria scores have been rounded to the nearest whole number.

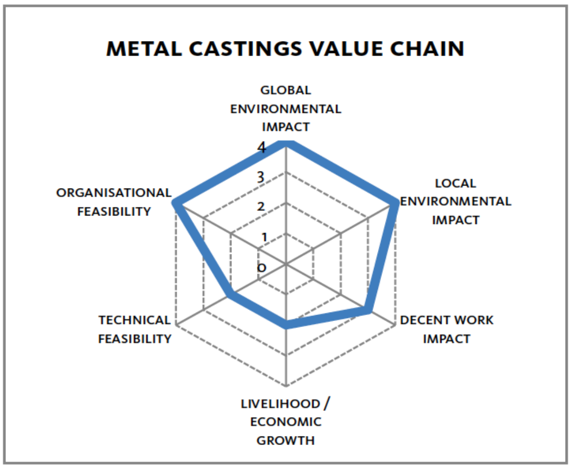
Table 9. Sector selection example

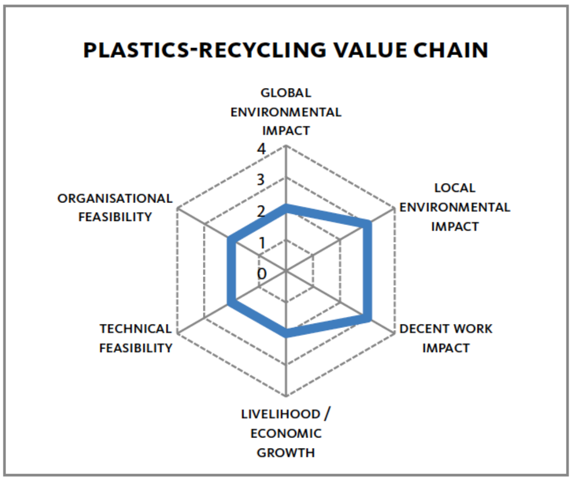
Assessment category	Pottery	Tea	Recycled plastics	Metal castings
Global environmental impact	3	3	2	4
Local environmental impact	3	3	3	4
Decent work impact	3	3	3	3
Livelihood/economic growth potential	2	4	2	2
Technical feasibility	4	4	2	2
Organisational feasibility	2	3	2	4
Total	**17**	**20**	**14**	**19**

Table 10. Sector selection example









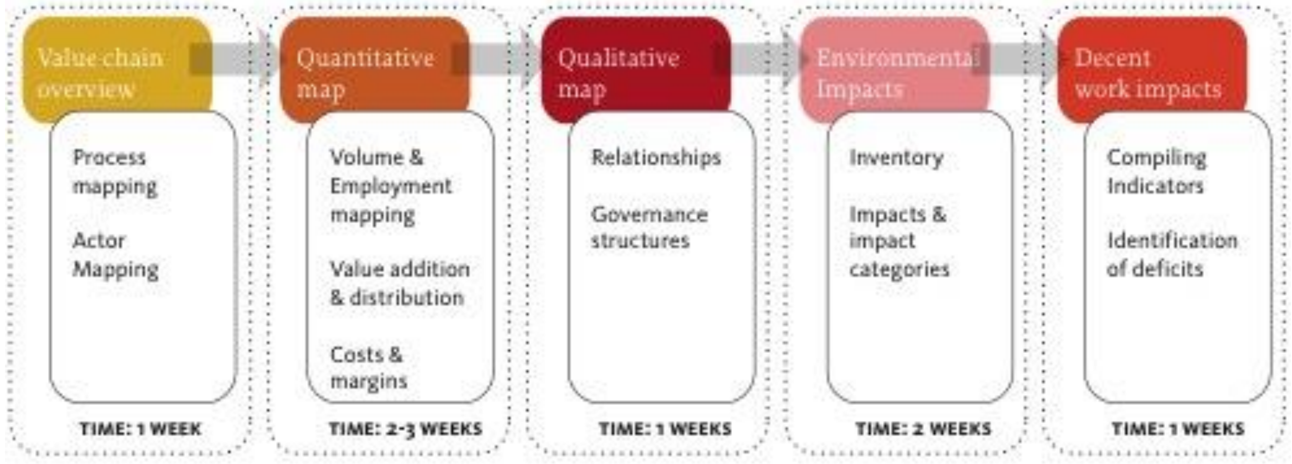
Control points

Below are identified key control points and associated compliance criteria for the value chain mapping phase. The column on the right identifies which control points are necessary to satisfy the requirements of the basic and advanced value chain analysis guidelines (note that all control points and compliance criteria must be met within the advanced approach).

Table 11. Key control points and compliance criteria

No	Control point	Compliance criteria	Level
Identification of scope			
	Project aims and objectives	Outline of the project's principal aims and objectives.	Basic
	Identification of scope of analysis	Outline of the geographical boundaries, analytical boundaries and scale of analysis.	Full
Data collection and analysis			
	Stakeholder mapping	Table outlining initial stakeholder mapping in relation to sustainable development in target country region, and identifying key sources of data on sectoral performance.	Basic
Selection of sub-criteria			
	Environmental impact (global/local)	Table presenting comparative data on potential (sub-) sectors for at least:	
		2 indicators from 2 environmental aspects	Basic
		4 indicators from 4 environmental aspects	Full
	Decent work	Table presenting comparative data on potential (sub-) sectors for at least:	
		2 indicators from 2 Decent Work Agenda elements	Basic
		4 indicators from 4 Decent Work Agenda elements	Full
	Green growth	Table presenting comparative data on potential (sub-) sectors for at least:	
		2 indicators from 2 green growth elements	Basic
		4 indicators from 4 green growth elements	Full
	Technical feasibility	Table presenting qualitative assessment of all identified issues	Basic
	Organisational feasibility	Table presenting qualitative assessment of all identified issues	Basic
Sector selection			
	Sector scoring	Table outlining sector scores for all selection criteria and identifying selected sub-sectors/value chains for further analysis.	Basic

Section 2. Value chain analysis and mapping



2.1 Process diagram

The first step in the development of a process map is the identification of all the process stages involved in the production/provision of a good or service.

Figure 1. Identifying process stages

Input supply › growing › harvesting › aggregation › withering › bruising / oxidation › rolling › drying › blending › packaging › distribution › retail

Where there are multiple steps that are uniformly undertaken by a single actor, these should then be grouped into a single process stage.

Figure 2. Grouping process stages

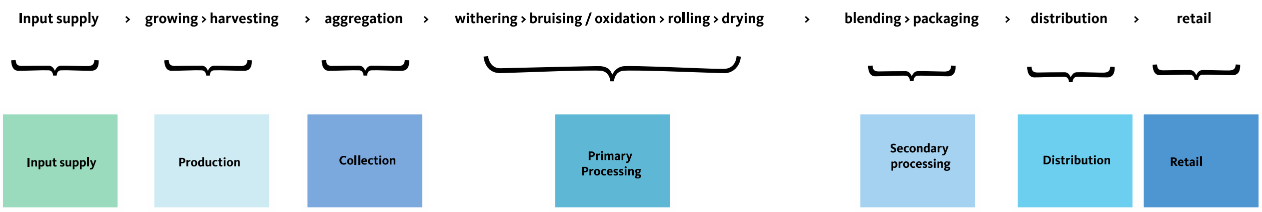


Figure 3. Mapping processes

2.2 Actor mapping

Actor mapping is intended to identify the principal actors directly and indirectly involved in the value chain, and their position within the process stages. This will involve listing all actors, aggregating these into common categories or actor types, and mapping the product flows between them. Note that along the vertical axis there may potentially be several different types of actors undertaking the same process activity within a given sub-sector, and along the horizontal axis some actors may sit across several process stages, or there may be more than one actor involved in a single process stage. The actor mapping will define the subsequent boundaries of analysis and engagement, therefore in producing the actor map it is important to ensure that the boundaries applied are commensurate with the ability of the project to gather and analyse data. For analytical purposes the project may wish to create more than one actor map - for example a full mapping of all actors involved in the chain, and a narrower mapping of actors subject to further analysis and engagement, either by limiting numbers or focusing on single discrete value chains within the wider sub-sector.

Create a list of market players

Value chain actors	**Support service providers**	**Operational service providers**
Small tea growers	District Agricultural Development office	Chemical suppliers
Marketing co-operative	Agricultural enterprise organisations	Agricultural bank
Integrated bought-leaf factories (small)	Tea sector office	Sapling suppliers
Integrated bought-leaf factories (large)	National Farmer's Federation	Small equipment and utensils retail suppliers
International wholesalers	National Tea and Coffee Development Board	Utility providers
Farmers groups and co-ops	Regional Agricultural Development Office	Development bank
Blenders/packagers	Regional Tea Producer's Assciation	Transportation providers
International retail outlets	Local Environmental and Management Association	Large machinery and equipment suppliers
Bought leaf factories (small)	Commercial Agriculture Alliance	Fuel suppliers
Tea shops/restaurants	District Chamber of Commerce and Industry	
Fertilizer suppliers	Development Organisations	
Integrated large-scale plantations	Ministry of Agriculture, Ministry of Industry and Commerce, Ministry of Local Development	
Plantations		
Local collectors		
National exporters		
Domestic shops and retailers		

The direct market actors should then be inserted into a grid under the relevant process heading(s), and lines added to indicate the linkages between actors.

Figure 4. Mapping direct actors (full version)

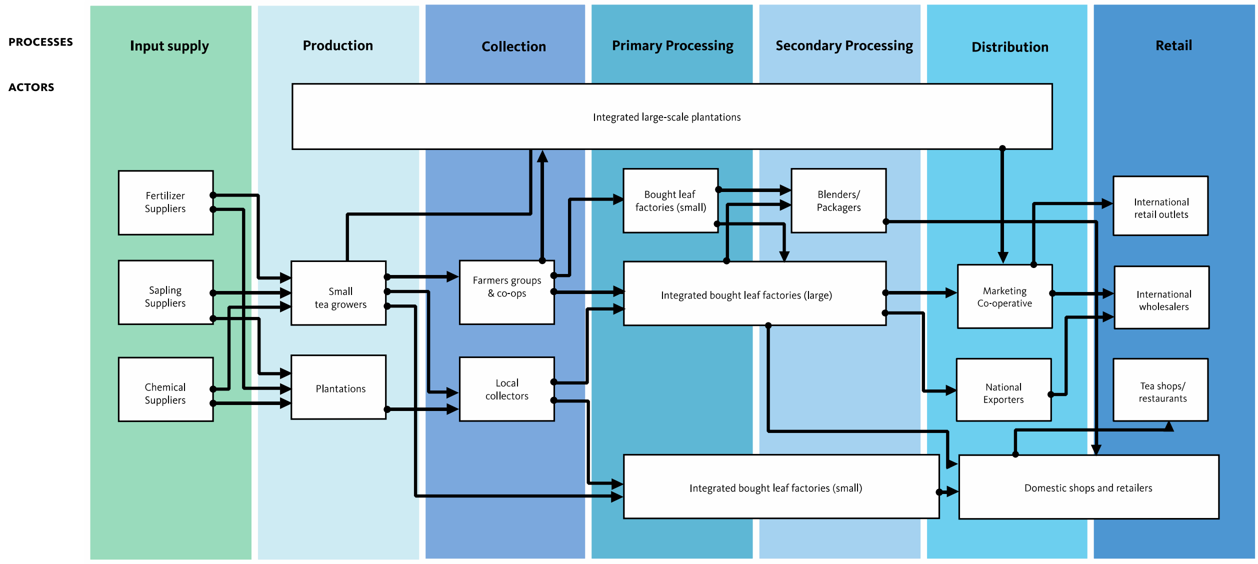


Figure 5. Mapping direct actors – identification of focus stages (basic version)

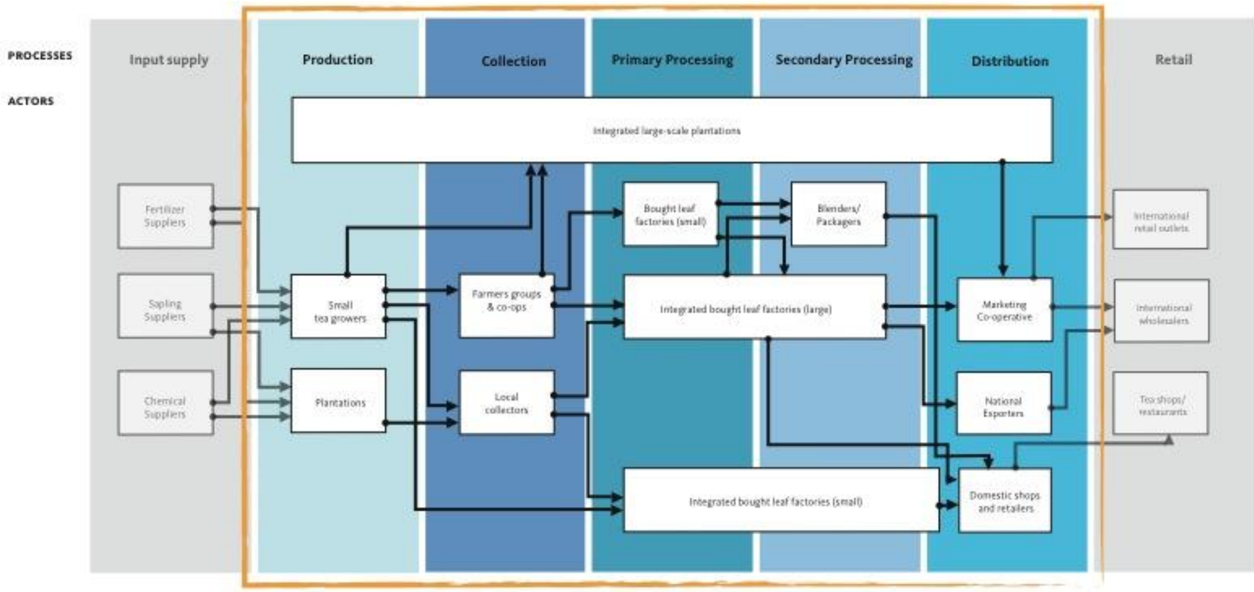


Figure 6. Mapping direct actors – number of actors (basic version)

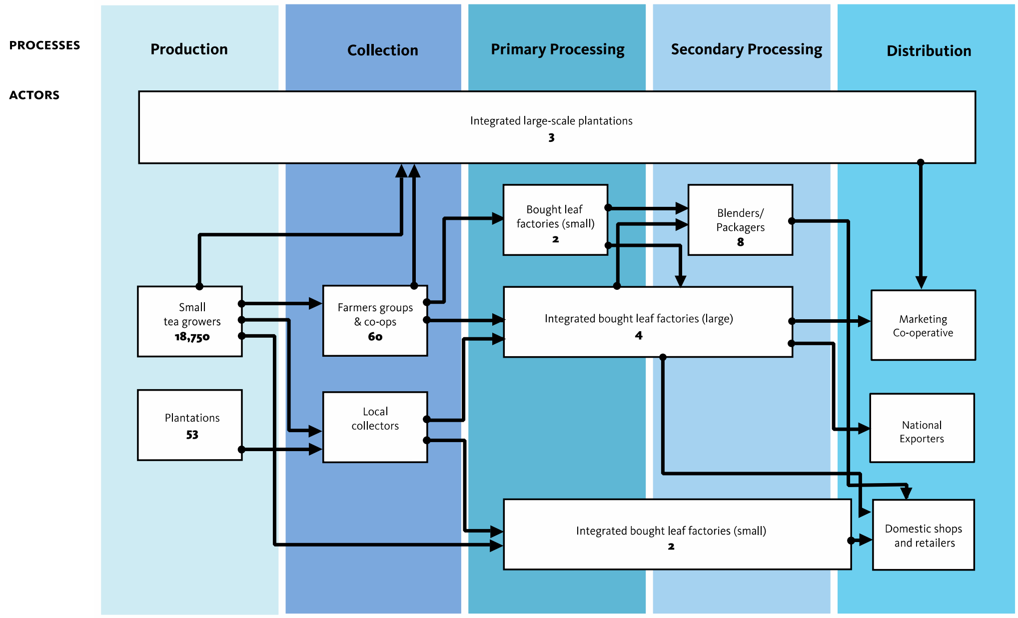


Figure 7. Mapping direct actors – identification of focus actors (basic version)

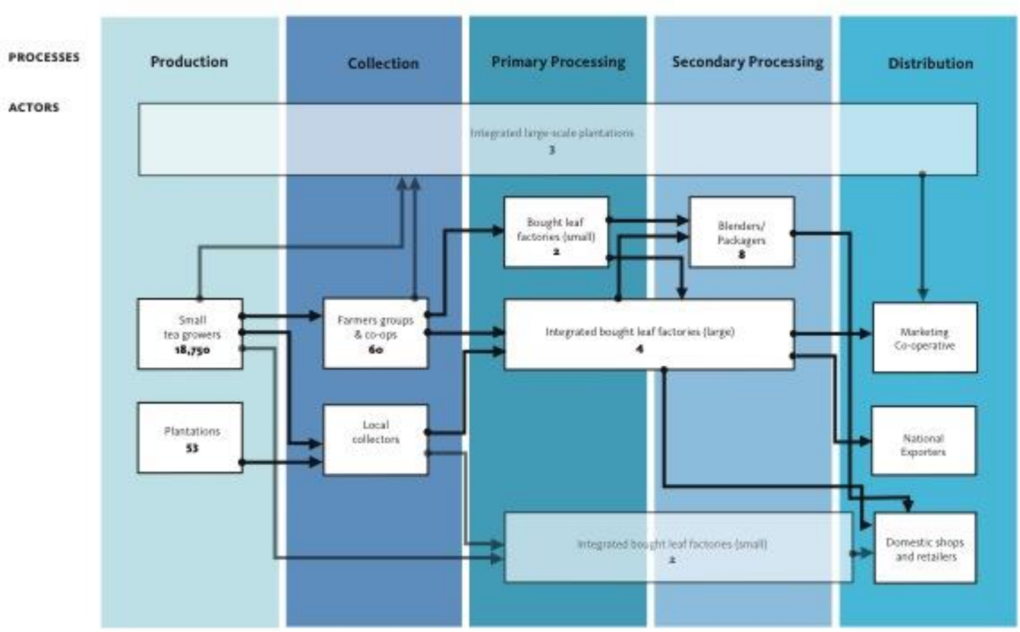


Figure 8. Mapping direct actors – value chain for further analysis (basic version)

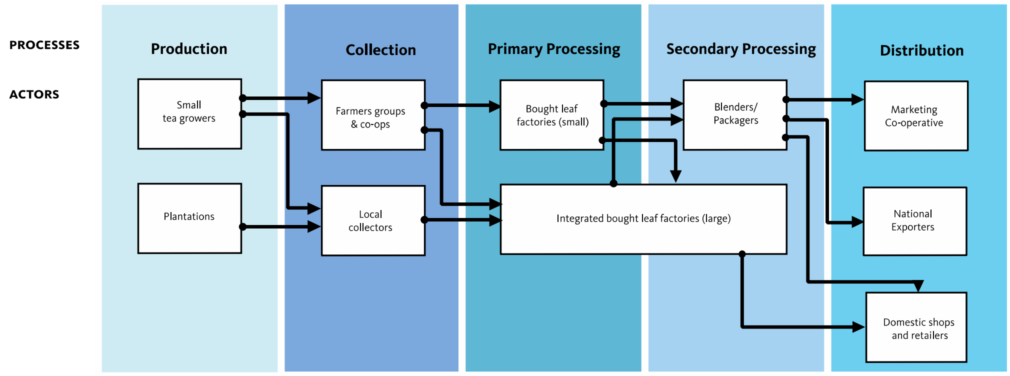


Figure 9. Mapping support service providers (full version)

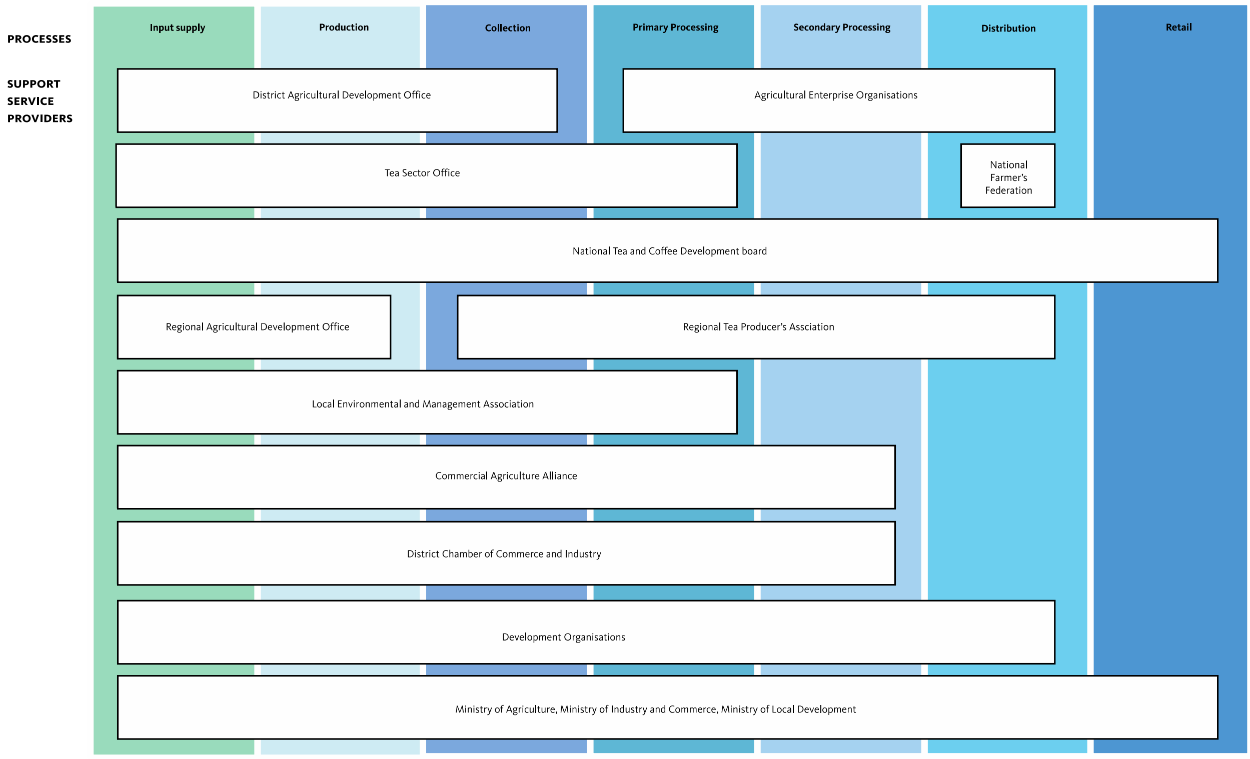


Figure 10. Mapping support service providers – identification of process stages (basic version)

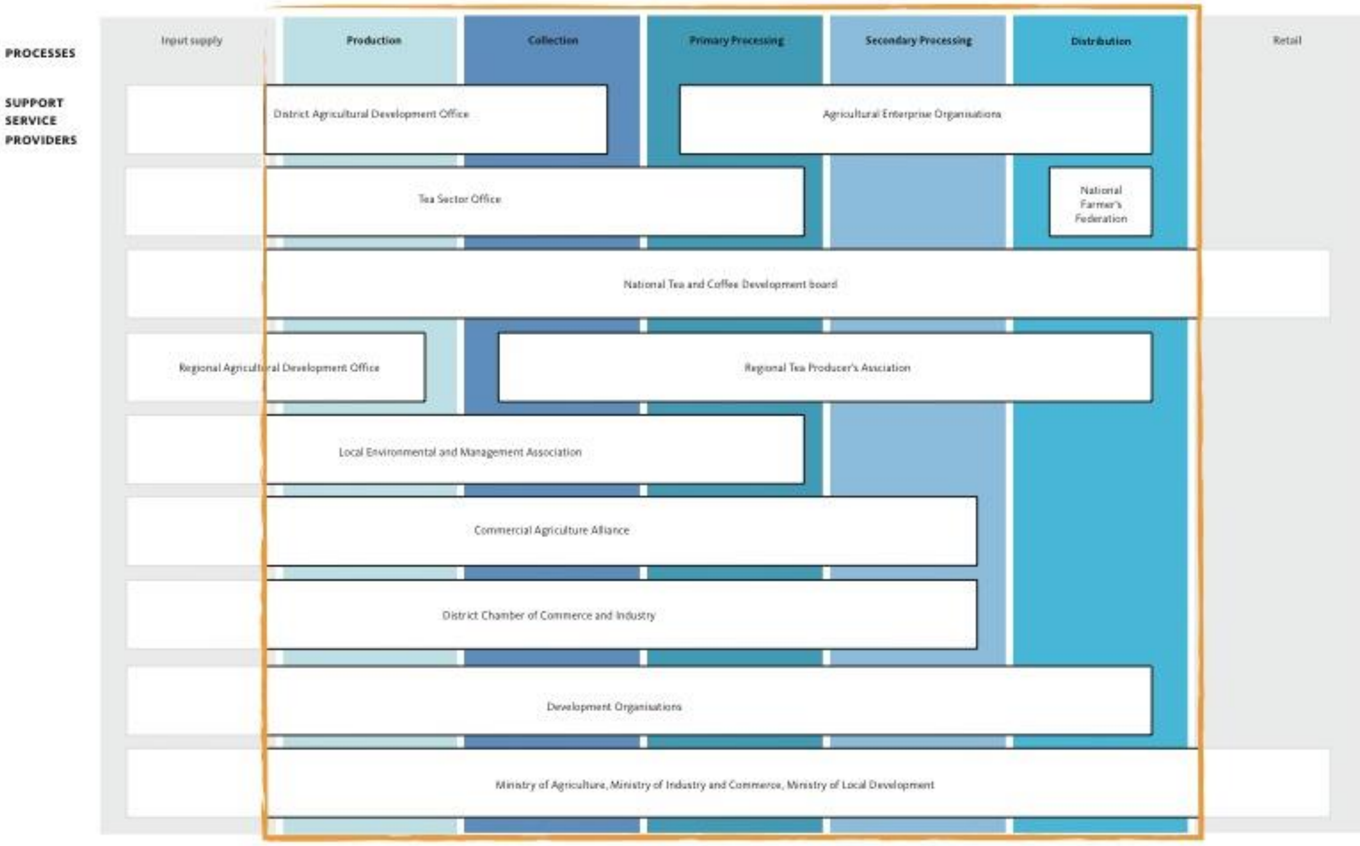


Figure 11. Mapping support service providers – identification of focus stages and actors (basic version)

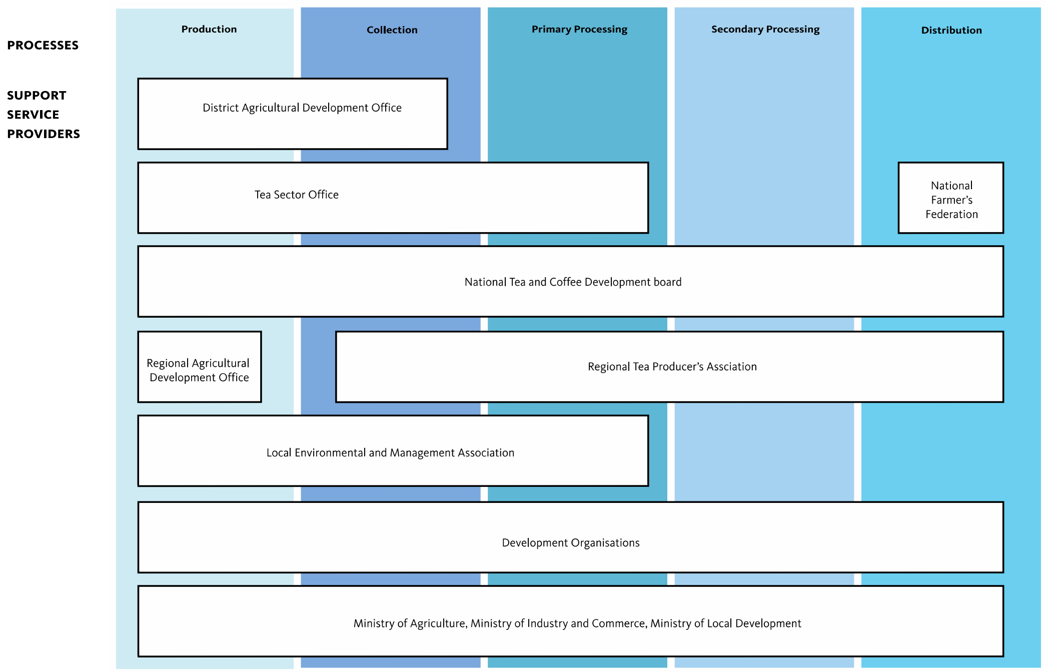


Figure 12. Mapping operational service providers (full version)

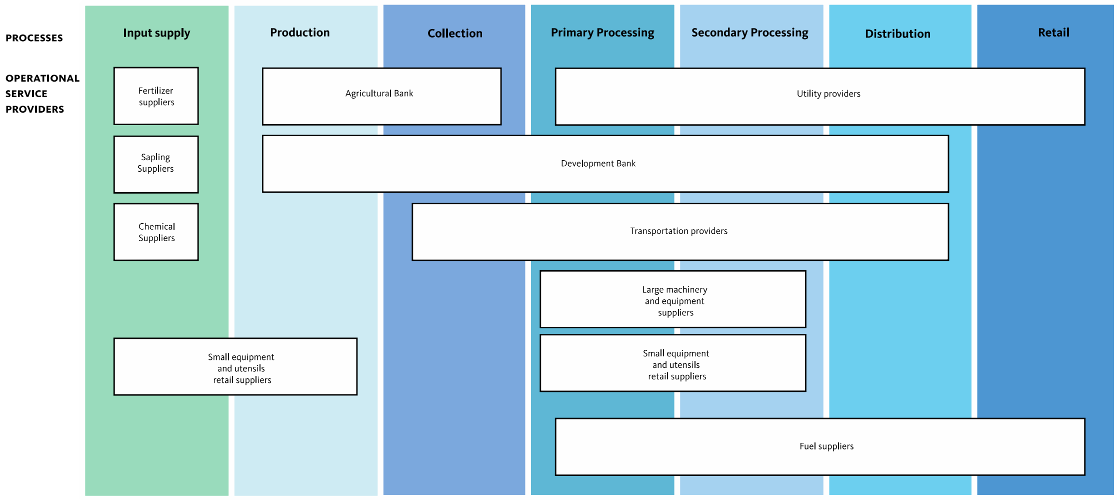


Figure 13. Mapping operational service providers – identification of process stages (basic version)

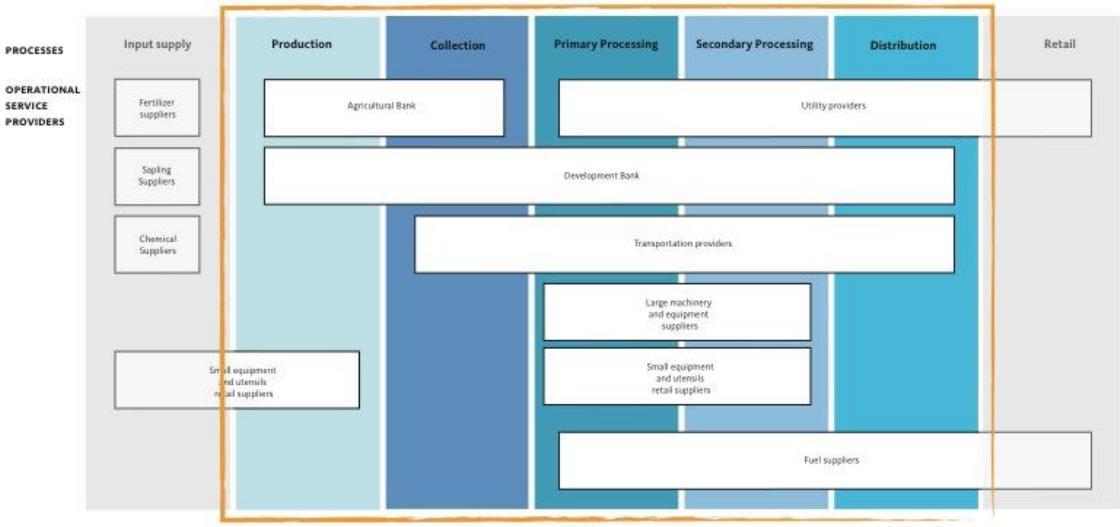
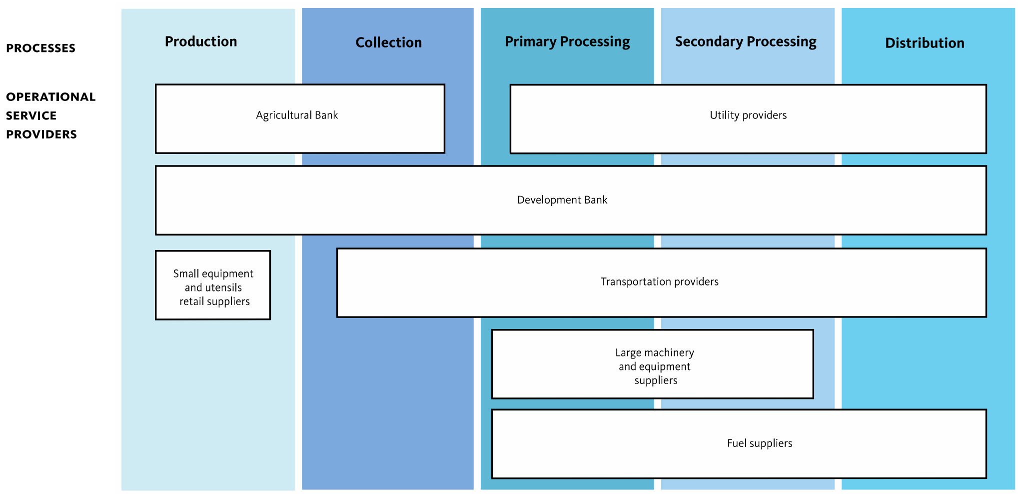


Figure 14. Mapping operational service providers – identification of focus stages and actors (basic version)



2.3 Volume analysis and employment impact

Mapping volume and employment is intended to provide a picture of the relative economic and social impacts of various actors and stages within the value chain. It is recommended that all data for both categories is gathered on an annualised basis to account for seasonal and other variations. Aggregate volume and the associated units of measurement may change as a product passes through various stages of the production process. Employment should be recorded in annual full time equivalents (FTEs), with terms and conditions identified to the greatest extent possible, and can be disaggregated according to project objectives (see below for examples in relation to gender and skills).

Figure 15. Volume analysis (full version)

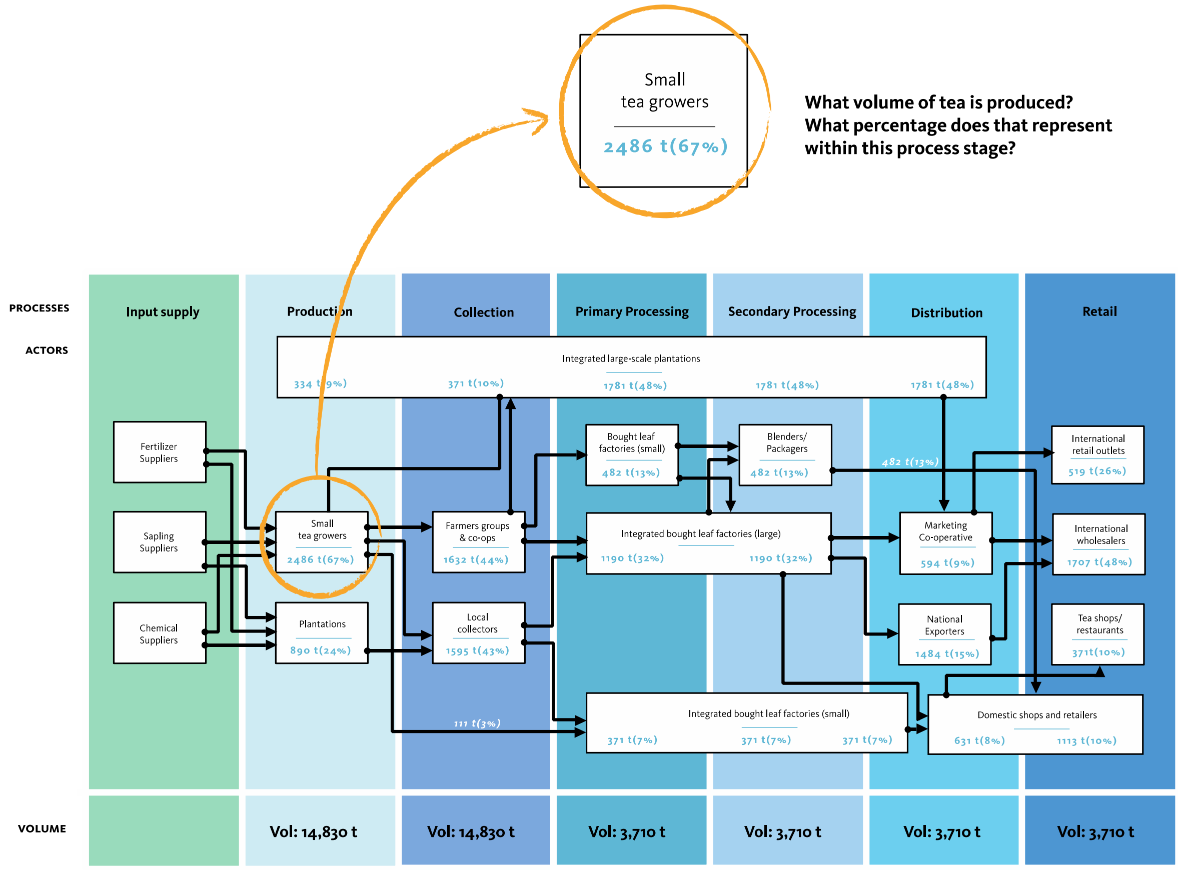


Figure 16. Volume analysis (basic version)

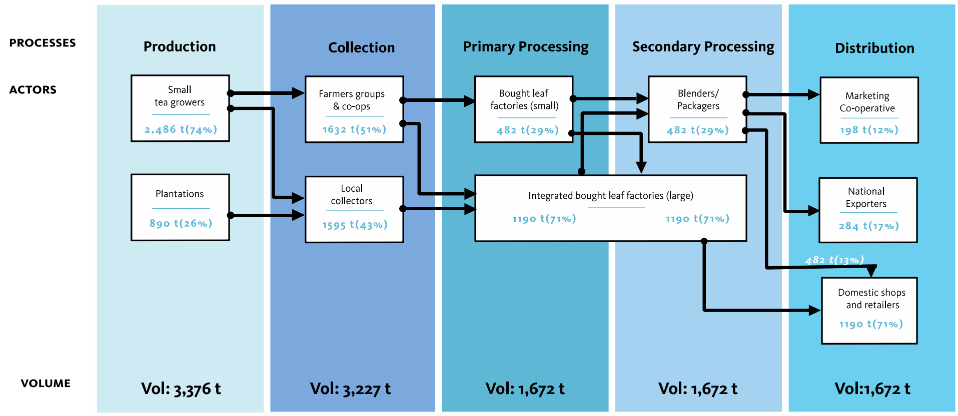


Figure17. Employment analysis (full version)

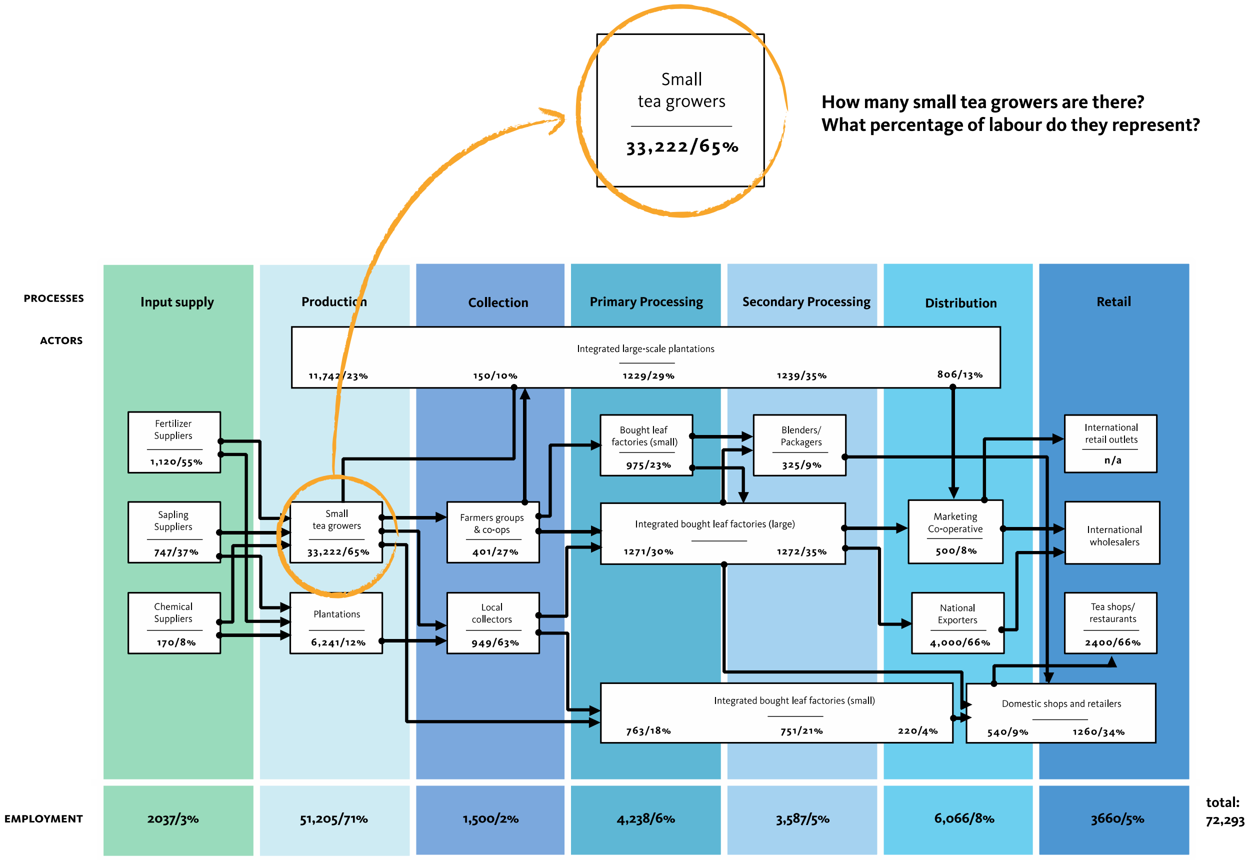


Figure 18. Employment analysis (basic version)

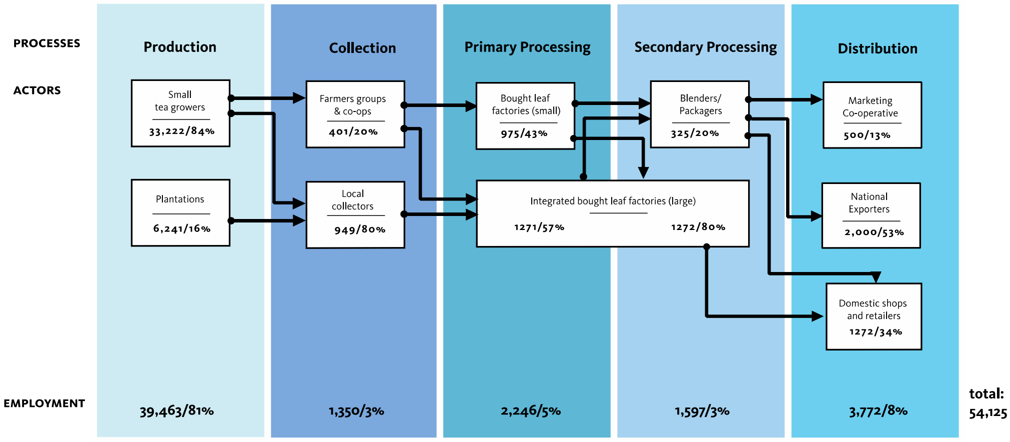


Figure 19. Employment broken down by formal and informal labour (full version)

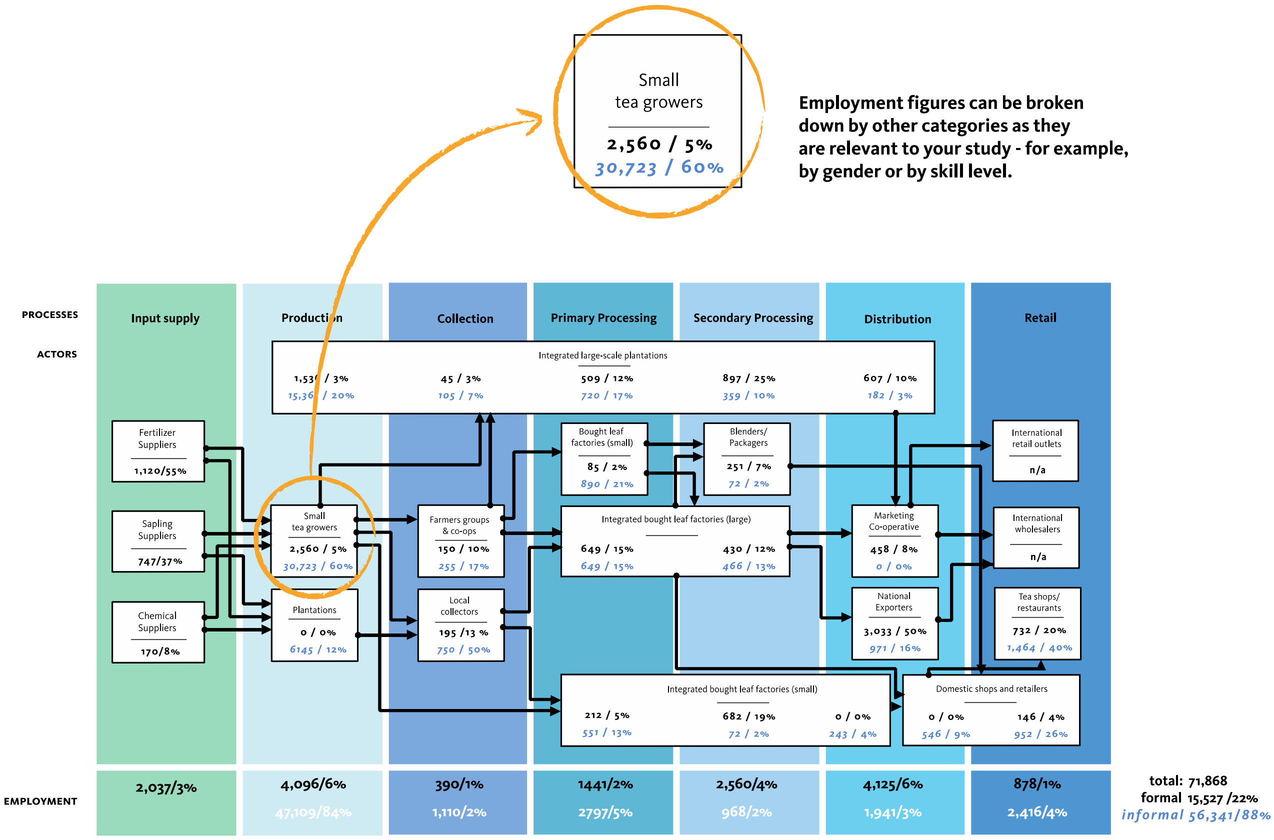


Figure 20. Employment broken down by formal and informal labour (basic version)

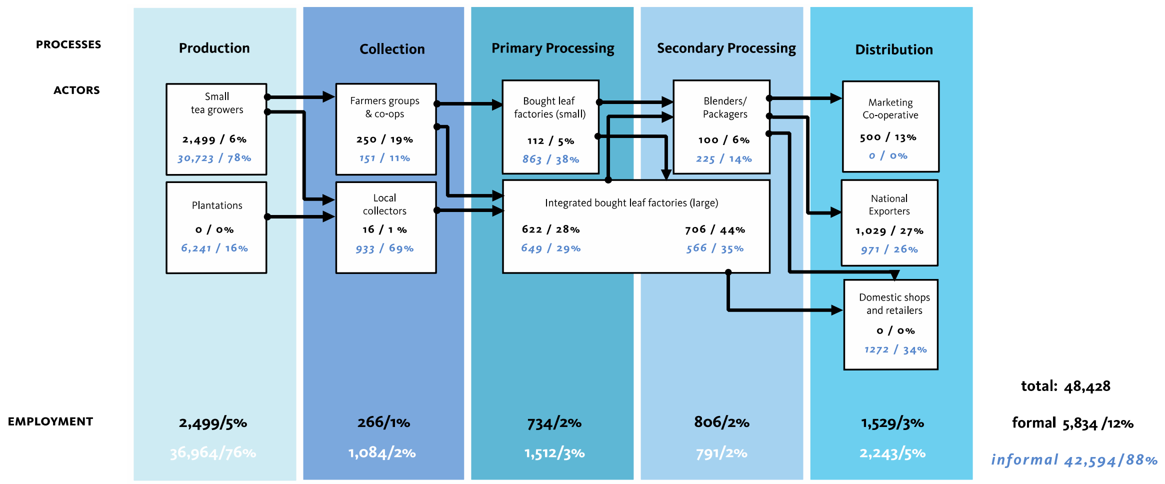
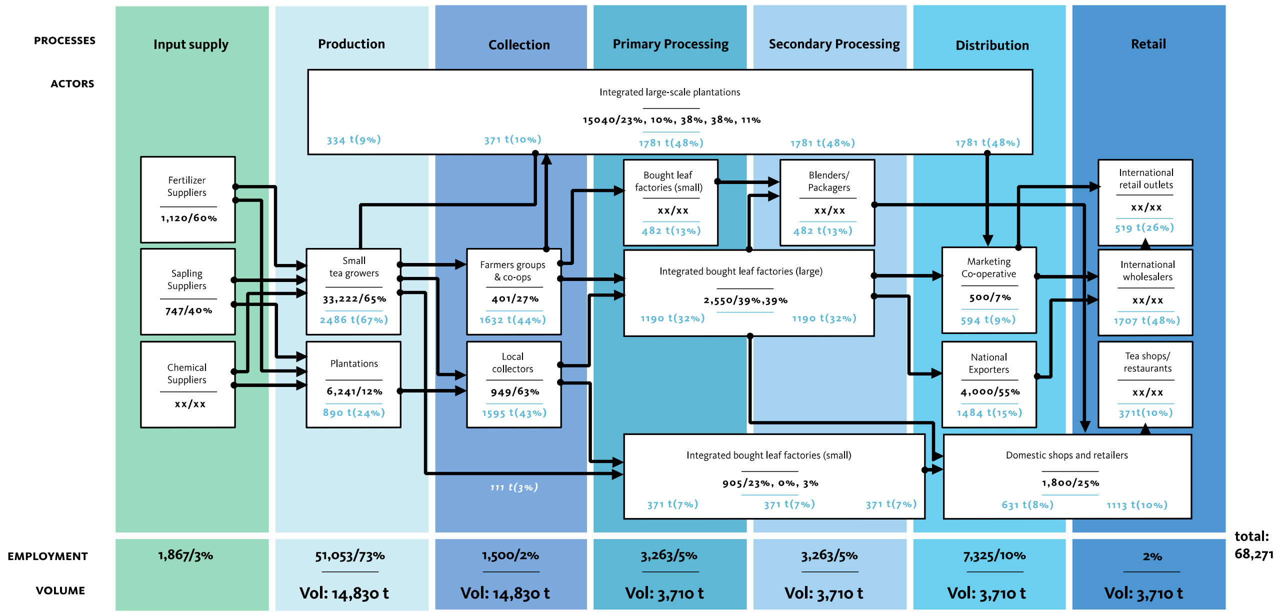


Figure 21. Volume and employment analysis (full version)



2.4 Value addition and distribution

Figure 22. Value addition/distribution (full version)

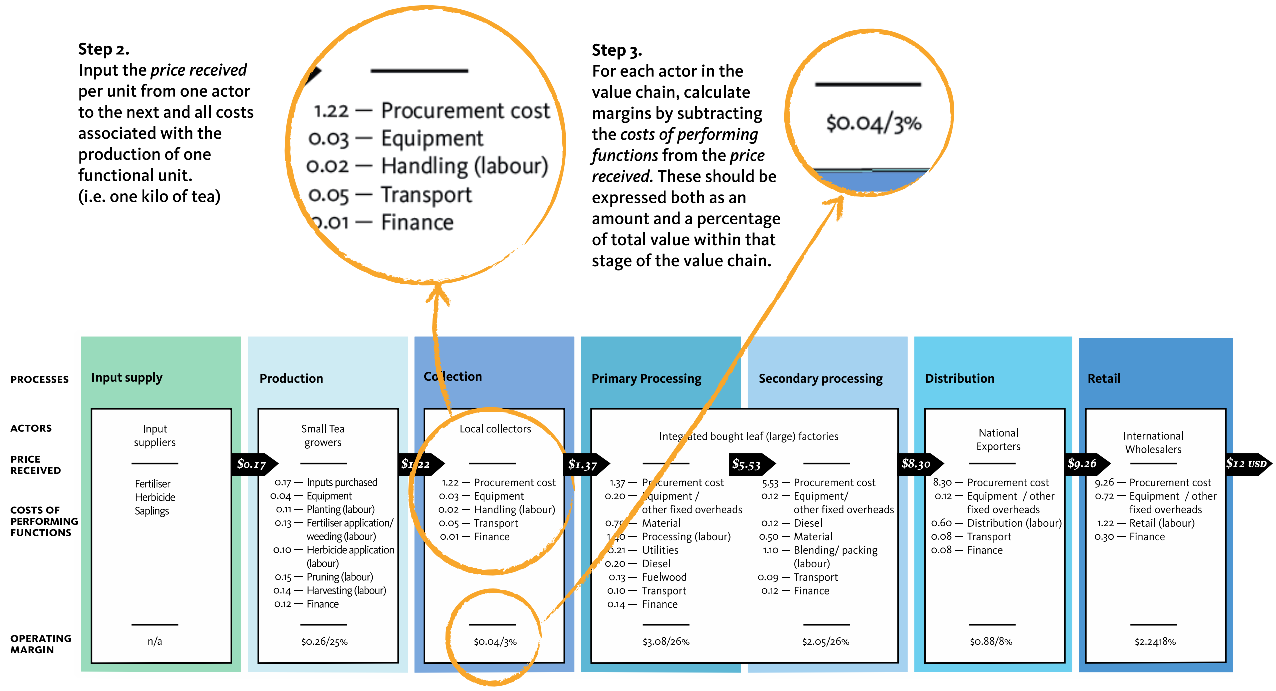
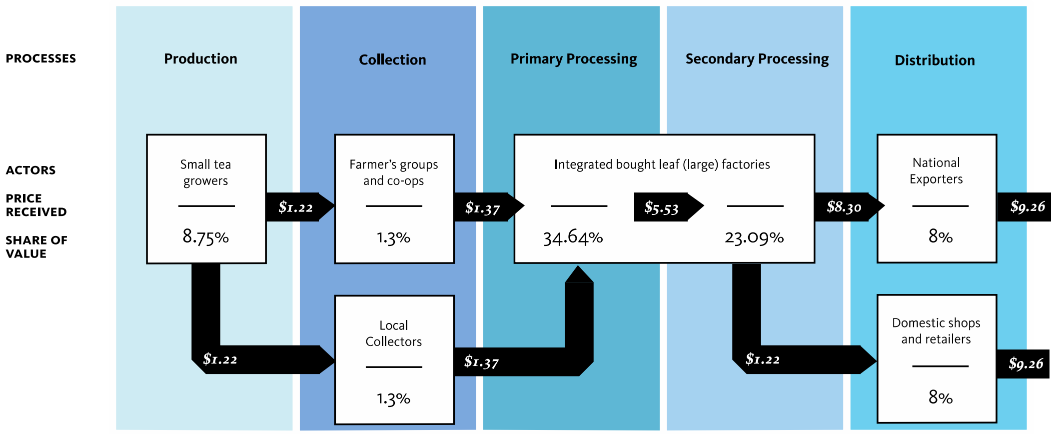


Figure 23. Value addition/distribution (basic version)



2.5 Cost and margin analysis

Figure 24. Cost/margin analysis (full version)

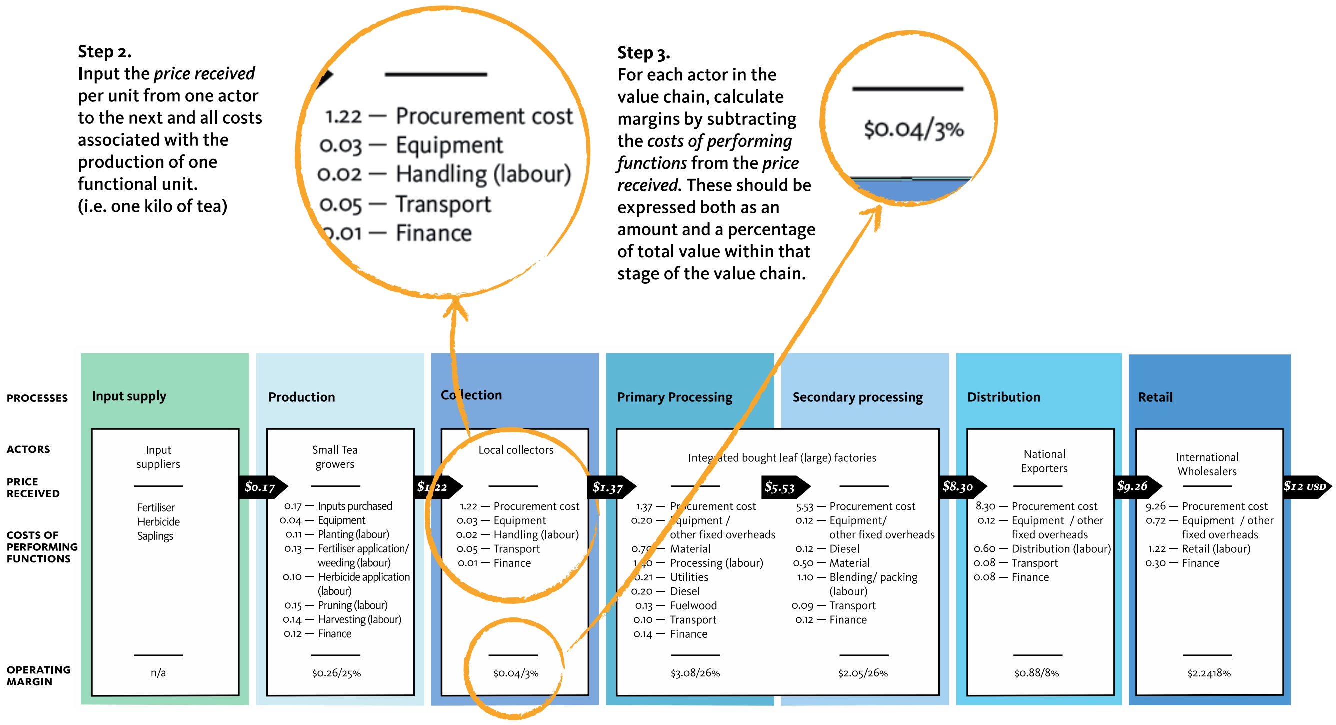
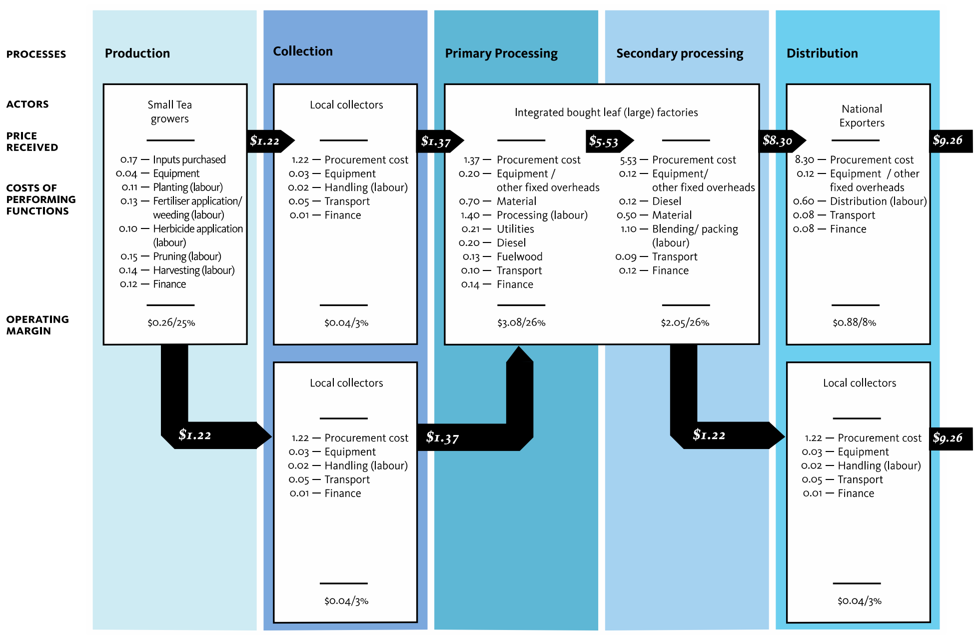


Figure 25. Cost/margin analysis (basic version)



2.6 Mapping and assessing governance

Figure 26. Actors and support service providers (full version)

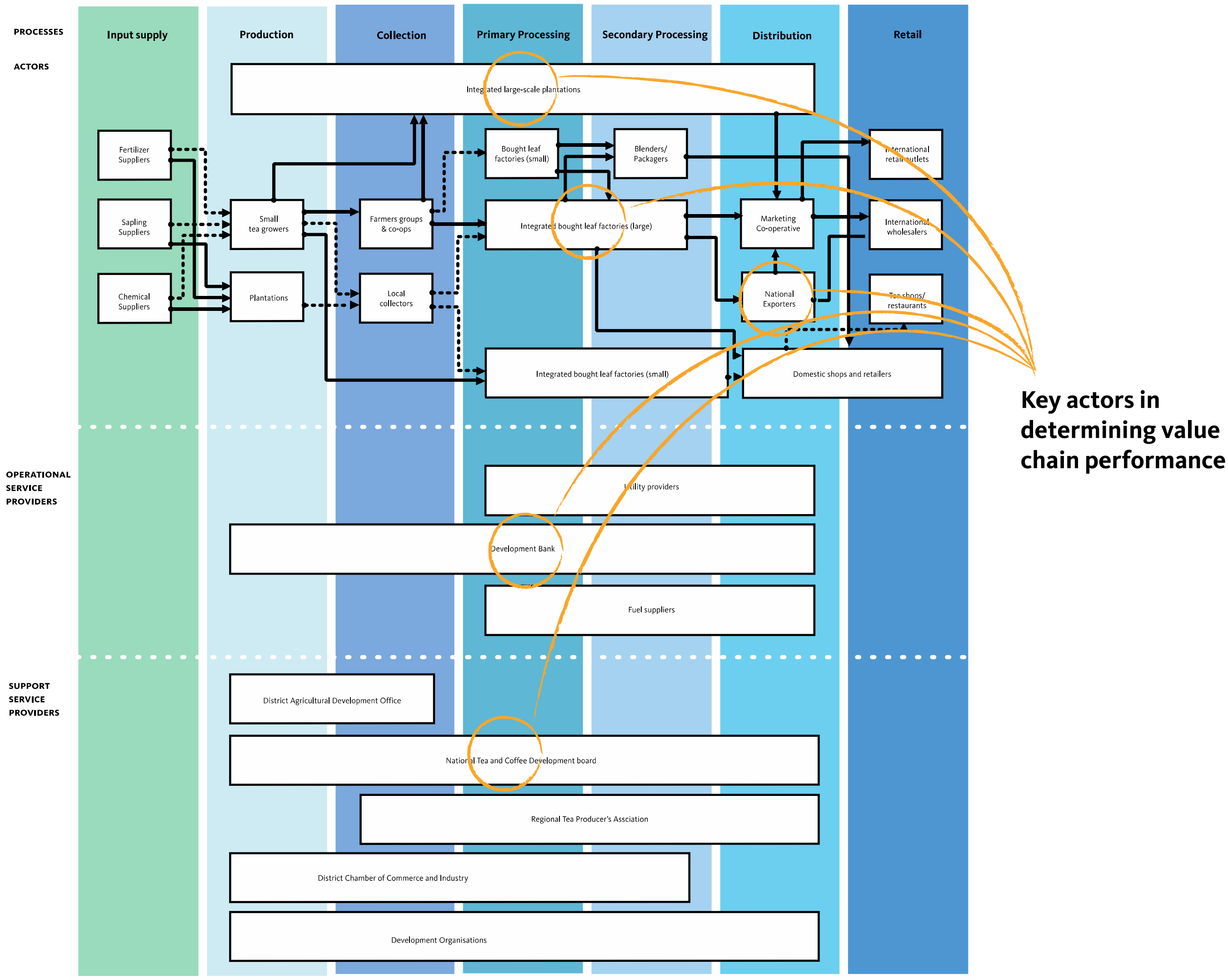
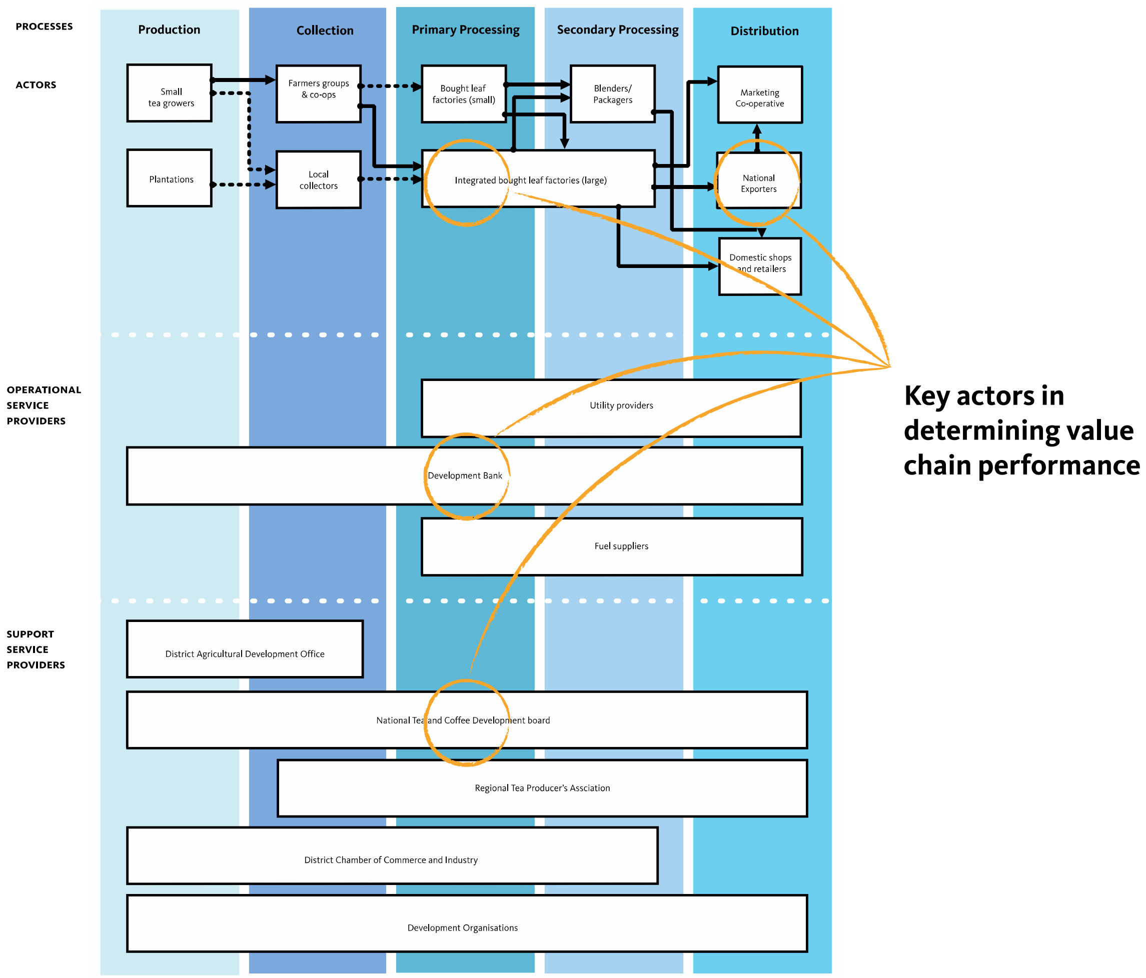


Figure 27. Actors and support service providers (basic version)



Box 1

Analysis of governance and linkages

The following guiding questions are useful when analysing governance and linkages in a value chain context:

With regard to governance:

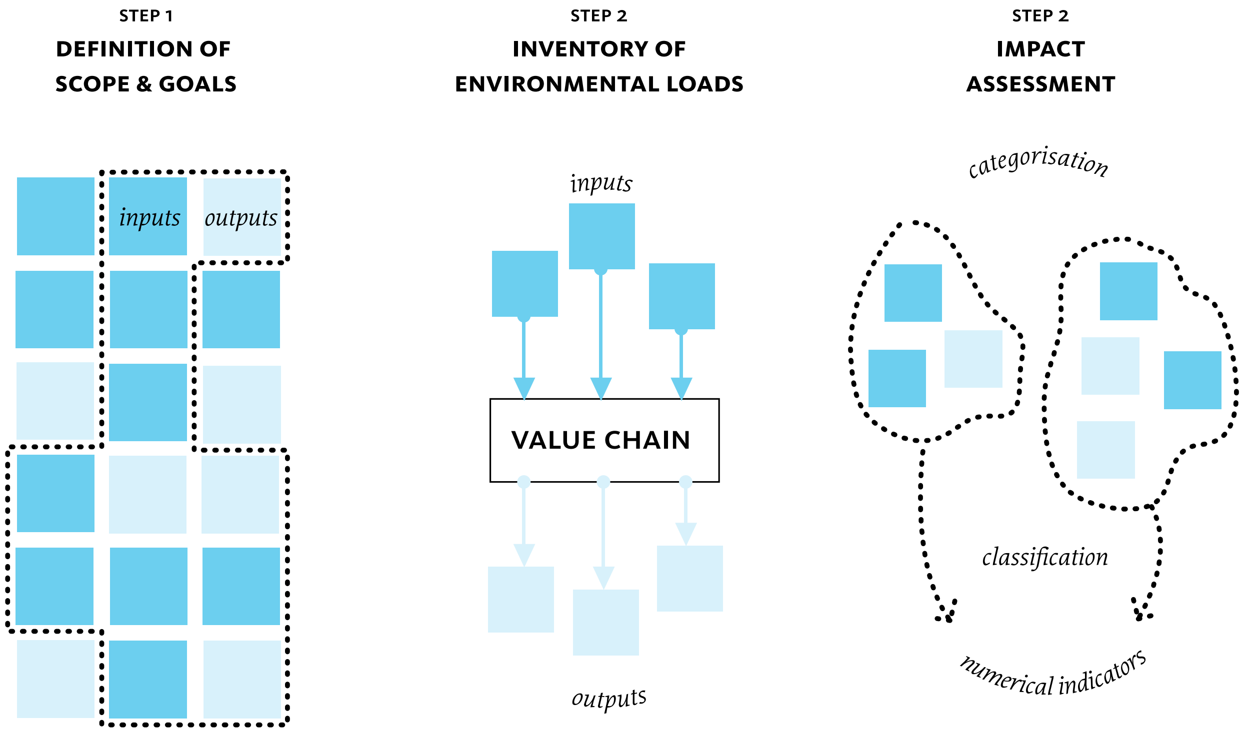
- What rules and regulations exist determining the functioning of the value chain?
- What is the impact of these rules and regulations on members in the chain and its overall performance?
- Which barriers to entry exist (e.g. required capacities and investments, economies of scale, membership in cartels, licenses etc.)?
- Who are the dominant agents and which type of power relationships exist?
- Which organizations and governmental authorities are responsible for natural resource management, environmental protection, renewable energies, energy, water and material efficiencies, recycling and/or pollution control?

With regard to linkages:

- What is the nature of the contractual relationships between the various actors in the chain (vertical coordination)? With what frequency and quality are those interactions performed?
- Are they short or long term? What are the dominant coordination arrangements?
- What are the common practices of communication and information exchange in the chain?
- What type of clusters and networks of industrial agglomeration and specialization operate in the chain?
- What types of horizontal coordination mechanisms exist between actors with similar roles in the value chain (partnerships, joint-ventures, cooperation agreements, associations, cartels, etc.)? Do these have any environmental implications in terms of resource and/or energy savings?
- What is the level of trust among the actors within and across the various stages of the value chain?

2.7 Environmental analysis

Figure 28. Stages of environmental analysis



Step 1: Definition of scope and goals

The initiation step within the environmental assessment framework involves the definition of the scope and goals of subsequent analysis.

At this stage of the value chain analysis, several necessary elements will already exist, including a definite set of aims and objectives for the individual value chain development project and a value chain chart identifying discrete unit processes.

There are, however, several further issues which must be addressed before undertaking an inventory analysis. These include the following:

1. Identification of functional unit and reference flow — this refers to the overall functional unit of analysis, defined as the quantified performance of a product system (i.e. by the primary function fulfilled by a product system). The reference flow relates to the measure of the outputs from processes in a given product system required to fulfil the function expressed by the functional unit (for example, using a litre of milk as the functional unit in assessing a dairy value chain). This is particularly relevant if the project wishes to focus primarily on unit efficiency — note that it does not in itself capture aggregate environmental loads and must be combined with accurate overall production data.
2. Definition of system boundaries — including the boundary separating the product system studied from other product systems, and the boundary between processes taken into account and those not taken into account in the product system. The initial value chain mapping and analysis exercise provides a chart identifying the main unit processes within the value chain. Check that

this relates to processes with environmental outcomes, and that boundaries between unit processes are appropriate. Where assessing multiple units (rather than individual units) make decisions on scope and scale of assessment i.e. single representative unit, or multiple units.

3. Criteria for inclusion of inputs and outputs — in standard Life Cycle Assessment (LCA) practice this refers to orders of magnitude (for example inputs/outputs as a percentage of total mass, volume or value). In the green jobs methodology it may also refer to the prioritisation of certain environmental loads (e.g. emissions of CO_2e, use of biotic resources such as water) over others. While this prioritisation process will also subsequently occur at the impact assessment stage, issues such as resource and data availability constraints (and the initial aims and objectives of the organisation) may circumscribe the specific environmental categories on which data is initially collected (for example, the primary remit of the project could be greenhouse gas emissions, or the prevention of deforestation and land degradation).
4. Allocation — having identified the system boundaries and inputs/outputs to be included, allocation involves the partitioning of the input or output flows of a process or other product system to the product system under study (for example, the allocation of impacts from co-production of refined sugar and molasses when assessing the sugar value chain).
5. Data quality requirements — this will include definition of coverage (for example period of analysis, geography, source, precision, completeness and representativeness).

Step 2: Inventory of environmental loads

The second step of the environmental assessment is inventory analysis — the identification and quantification of the environmental loads involved in each unit process within the value chain. This involves the collection of data for all physical inputs (raw materials and energy) and outputs (products and solid, liquid and gaseous emissions) at each stage of the of the value chain, and is generally the most time-consuming stage of the environmental assessment process.

Each unit process inventory contains only emissions and resource inputs from one process step (as defined in the initiation phase), plus references to input from other unit processes. So for example the unit process “dairy processing” contains only “transport of chilled milk to processing unit, processing and packaging”. The unit process starts at the point where the milk arrives as part of another process - the environmental load connected to all activities prior to this is therefore captured in a series of other unit processes.

Box 2

Making use of Life Cycle Inventory (LCI) databases

Within a conventional LCA framework, a large percentage of the Life Cycle Inventory (LCI) is typically derived from or validated against existing (benchmark) data on a given impact — examples of existing LCI databases are outlined below (note that not all of these databases are publicly accessible):

- **established LCI databases widely used in LCA practice:** GaBi, SimaPro, KCL-Eco, LCAit, SPINE, TEAM, Umberto;
- **national LCI database projects:** Australia, Canada, Germany, Italy, Japan, Switzerland, United States; and
- **multinational LCI database projects:** Action 530, eLCA.

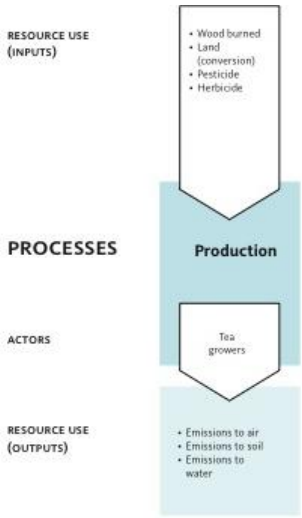
Working in a developing country context, and examining unit processes that may not have clear or direct comparators within existing environmental impact databases, may require both a greater degree of initial primary data collection, and a higher degree of qualitative assessment. Note that once the inventory analysis process has begun, it may also become necessary for reasons such as data availability to revisit the parameters determined in Step 1, including the identification of system boundaries, the division of process steps, criteria for inclusion of inputs and outputs and overall data quality requirements.

Figure 29. Input and output categories

Input category	**Input sub-category**
Resource use	Energy use Energy use (source) Land use Water use Other resources (renewable) Other resources (non-renewable)

Output category	**Output sub-category**
Emissions to air	Greenhouse gases (GHGs) Ozone-depleting gases SOx/NOx/NH4 Particulate matter (PM) (e.g. TSP/PM10/PM 2.5) VOCs
Emissions to water	Compounds of P, K and N Toxic chemicals (e.g. pesticides, herbicides) Heavy metals (e.g. Pb)
Emissions to soil	Toxic chemicals (e.g. pesticides, herbicides) Heavy metals (e.g. Pb)
Solid waste generation	Biodegradable Non-biodegradable Hazardous

Figure 30. Initial inventory – single value stage



The initial outcome of the inventory analysis will be the production of input/output tables for each unit process within the value chain. The following figure provides an example of the resulting input/output inventory using the basic flow chart template — note that in most cases an inventory of the entire value chain will require a number of individual flow charts or sub-charts (for example where several market channels exist, or where a range of actors exist at any one node of the value chain). It is recommended that these input/output tables capture aggregate (rather than solely functional unit) inputs and outputs in order to present an accurate picture of overall environmental load.

These individual unit process input/output tables will then be aggregated to create an inventory of total environmental loads, as shown in figure 31.

Figure 31. Initial value chain inventory (full version)

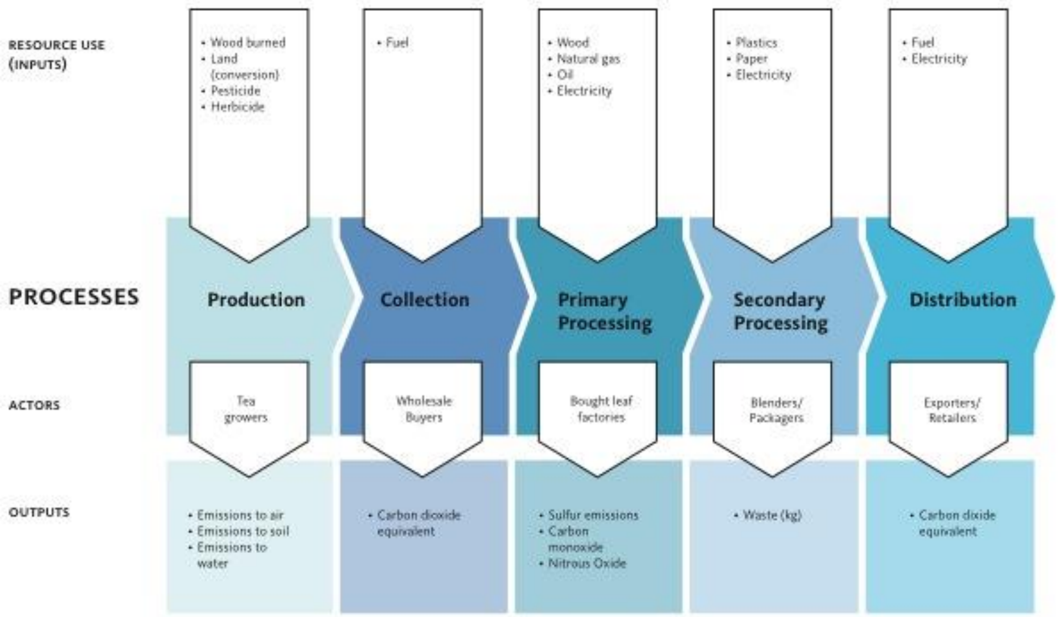


Figure 13. Prioritisation of value chain stages for further analysis

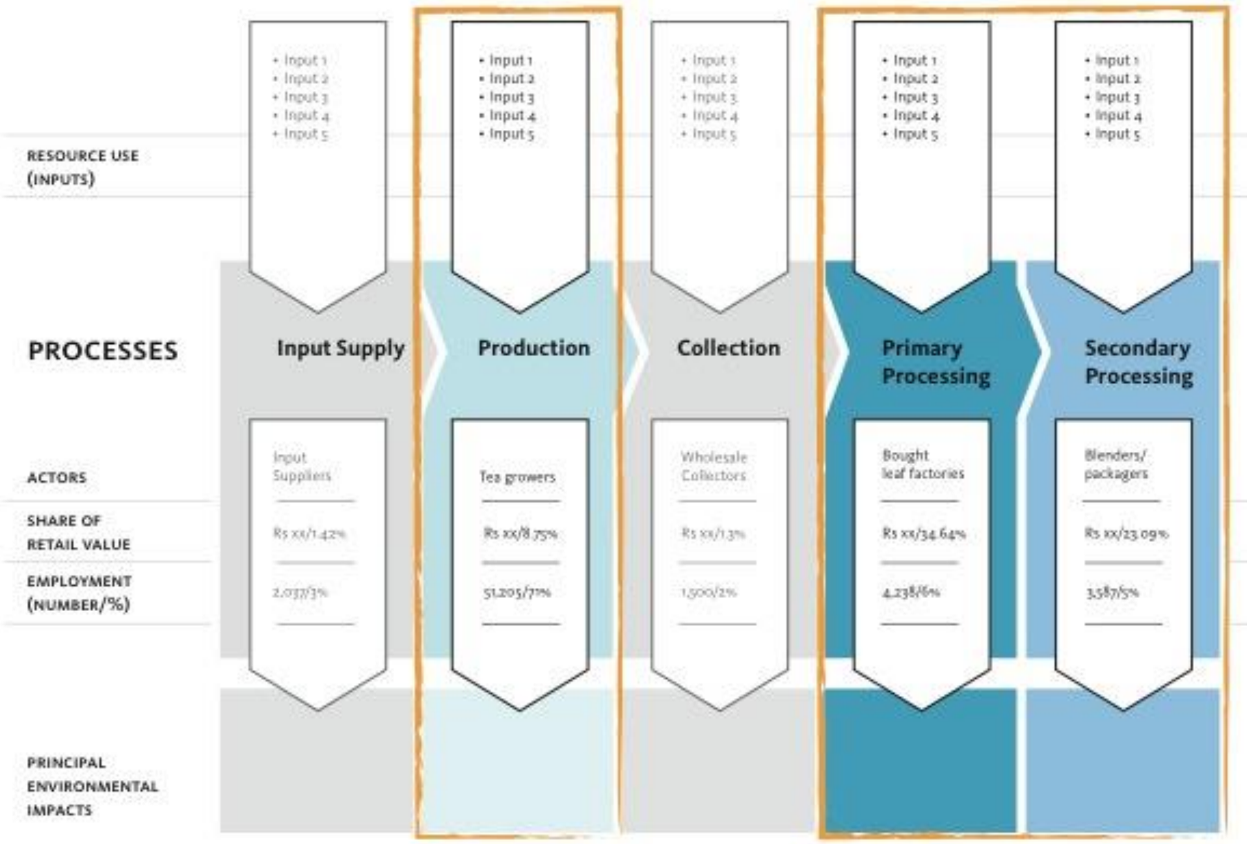
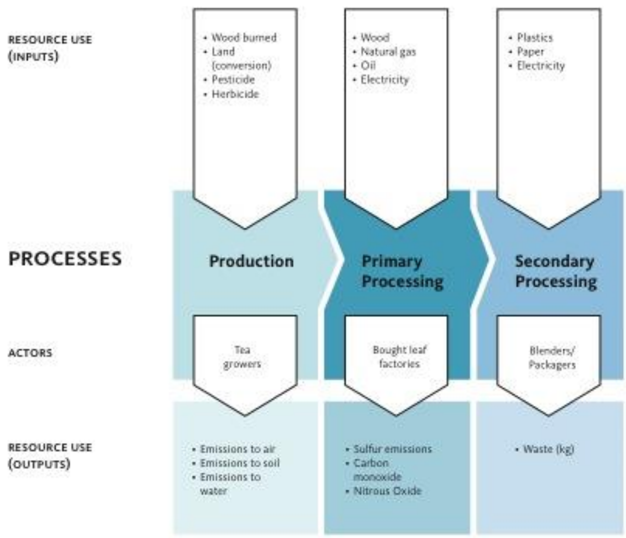


Figure 33. Initial value chain inventory (basic version)



Step 3: Impact assessment

The third step of the environmental assessment process is the impact assessment, a process to examine the potential and actual environmental effects of the environmental loadings identified in the inventory component (Step 2). Within the green jobs value chain approach, this involves two principal stages: classification, and characterization. Classification involves the assignment of impacts identified in the inventory process to impact categories. This requires the identification of impact categories, common unit indicators and conversion factors. Characterization is the conversion of the impacts identified in the inventory by those factors into a common unit, and their aggregation to produce a single numerical indicator within the selected impact category.

Box 3
A classification of major environmental problems

Resource depletion
The extraction of non-renewable materials such as ores and fossil fuels.

Global warming
Increasing amounts of CO_2 and other greenhouse gases in the Earth's atmosphere are leading to increased absorption of the radiation emitted by the Earth and hence to global warming. CO_2, N_2O, CH_4, and CFCs all contribute to global warming.

Smog (photochemical oxidant) formation
Under the influence of ultraviolet (UV) light, nitrogen oxides react with VOCs, producing the photochemical oxidants that cause smog.

Acidification
Acid deposition, resulting from the release of nitrogen and sulphur oxides into the atmosphere, on soil, and water can lead to changes in soil and water acidity, which effects both flora and fauna.

Eutrophication/nutrification
Addition of nutrients to water or soil increases the production of biomass. In water, this leads to a reduction in oxygen concentration which affects higher organisms such as fish. In both soil and water, nitrification can lead to undesirable shifts in the number of species in ecosystems and thus to a threat to biodiversity.

Ozone depletion
Depletion of the ozone layer leads to an increase in the amount of UV-B radiation reaching the Earth's surface which may result in increases in some human diseases, damage to materials such as plastics, and interference with ecosystems.

Human toxicity
Exposure to toxic substances – through air, water, or the soil, especially via the food chain – caused human health problems.

Ecotoxicity (aquatic and terrestrial)
Flora and fauna can be damaged by toxic substances. Ecotoxicity is defined for both water (aquatic ecotoxicity) and soil (terrestrial ecotoxicity).

Figure 34. Classification and characterisation

INVENTORY ► IMPACT CATEGORY ► UNITS

INPUTS		
Resource use	Tbc	Tbc
Energy use	Tbc	Tbc
Energy use (source)	Tbc	Tbc
Land use	Tbc	Tbc
Water use	Tbc	Tbc
Other resources (renewable)	Tbc	Tbc
Other resources (non-renewable)	Tbc	Tbc

OUTPUTS
Emissions to air
Greenhouse gases (GHGs)
Ozone-depleting gases
SOx / NOx / NH4
Particulate matter (PM) (eg.TSP/PM10/PM 2.5)
Volatile Organic Compounds (VOCs)
Emissions to water
Greenhouse gases (GHGs)
Compounds of P, K and N
Toxic chemicals (eg. pesticides, herbicides)
Heavy metals (eg. Pb)
Emissions to soil
Toxic chemicals (eg. pesticides, herbicides)
Heavy metals (eg. Pb)
Solid waste
Biodegradable
Non-biodegradable
Hazardous

IMPACT CATEGORY	UNIT
Global Warming	g CO_2-eq.
Acidification	g SO2-eq.
Eutrophication	g NO_3-eq.
Smog Formation	g Ethene eq.
Ozone Depletion	CFC 11 eq.
Human Toxicity	HTx eq.
Eco Toxicity	ETx eq.

Figure 35. Value chain diagram incorporating environmental impacts (full version)

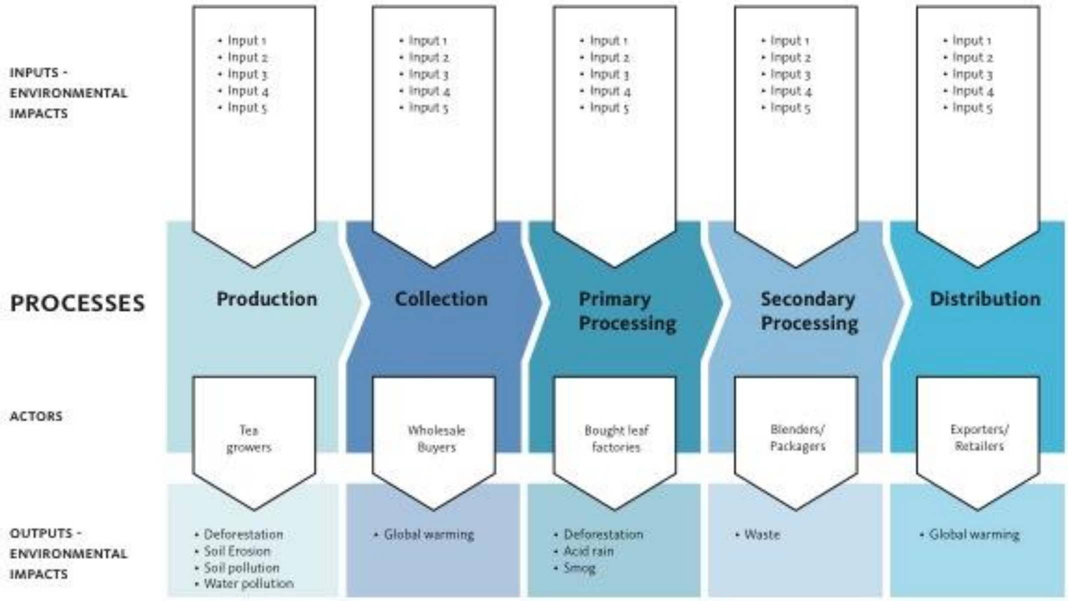
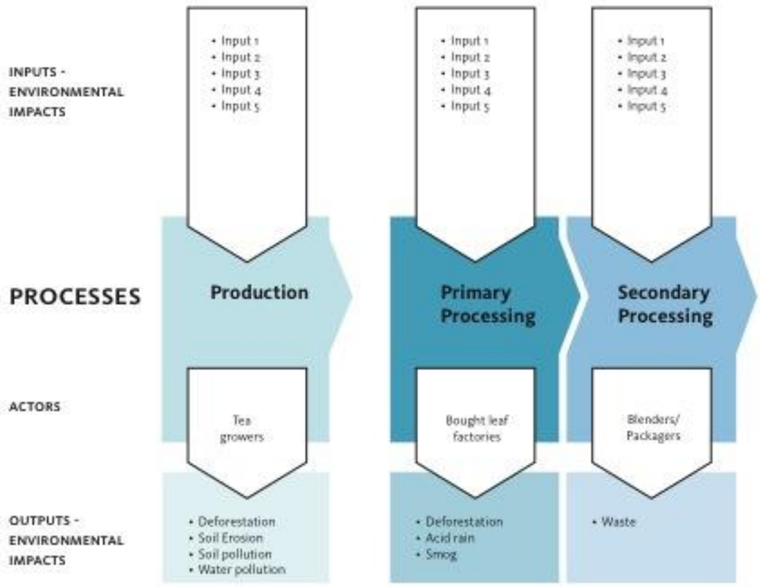


Figure 36. Value chain diagram incorporating environmental impacts (basic version)



2.8 Decent work analysis

Figure 37. Value chain diagram incorporating decent work impacts (full version)

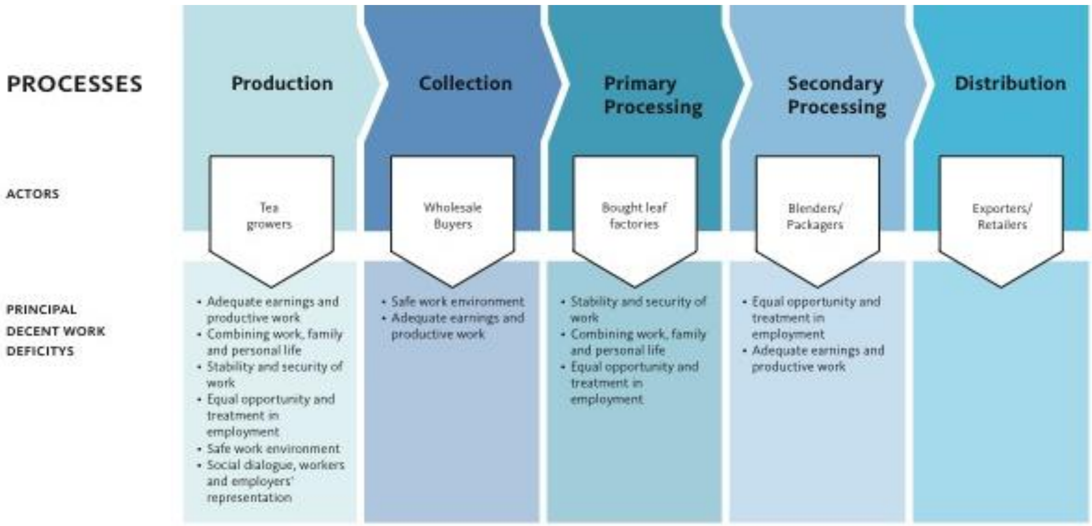
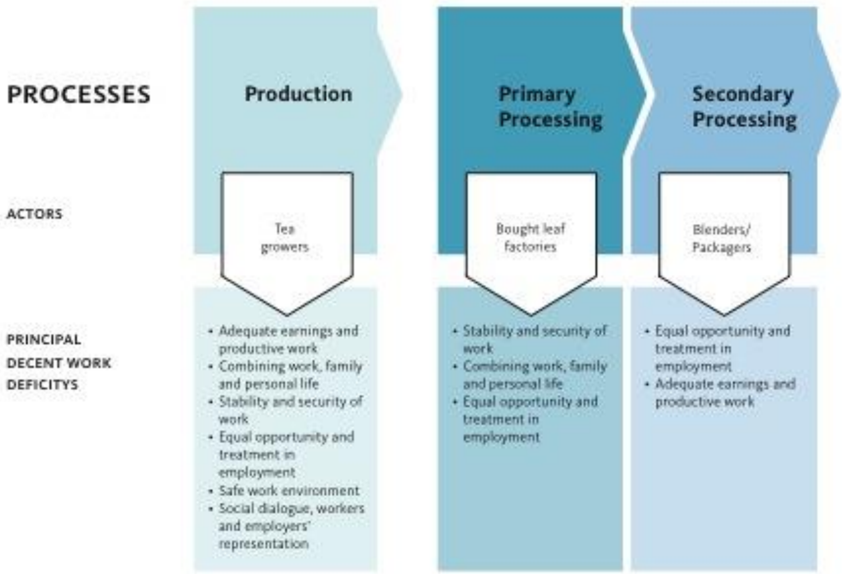


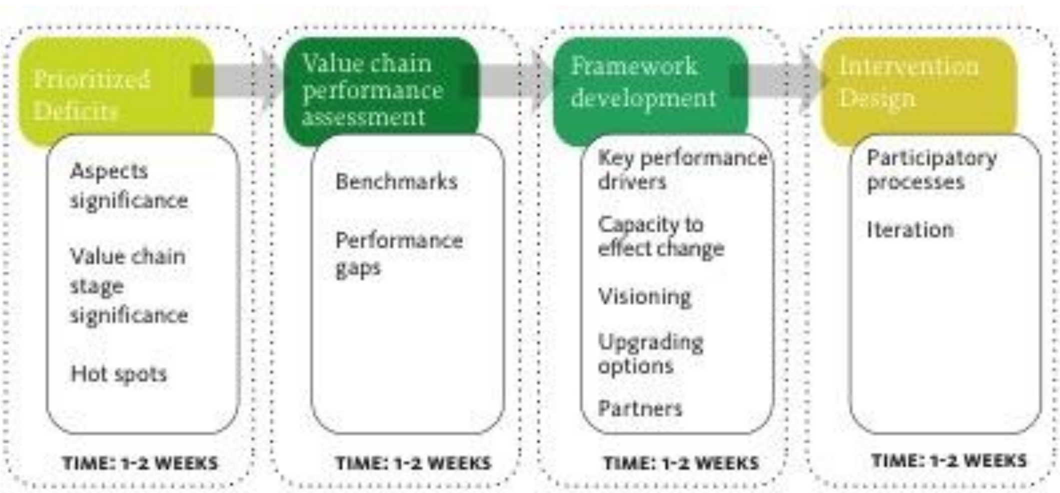
Figure 38. Value chain diagram incorporating decent work impacts (basic version)



Control points

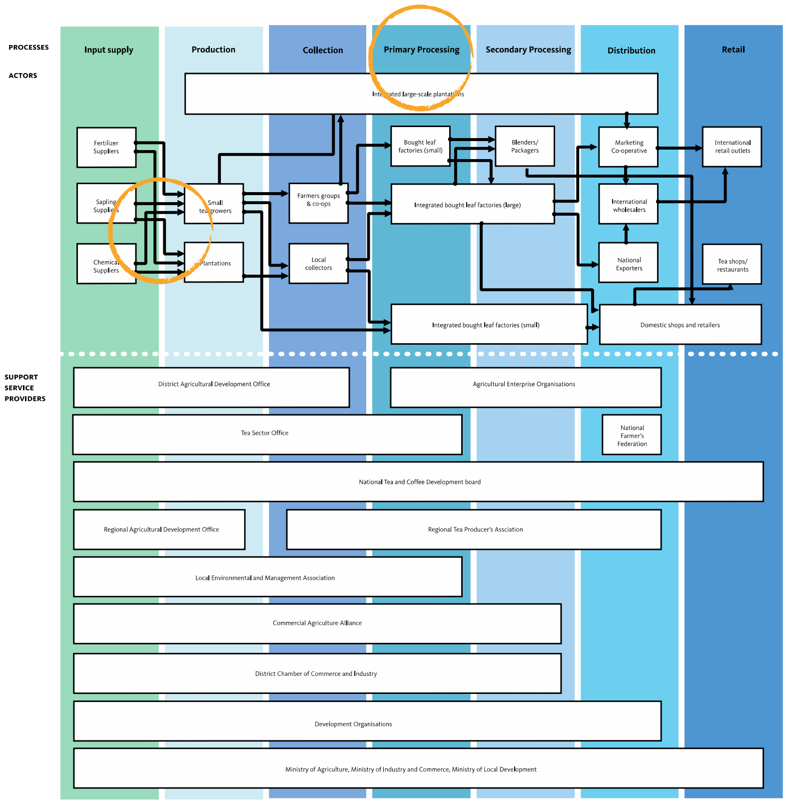
No.	Control point	Compliance criteria	Level
	Mapping processes and actors	Diagram outlining the key process stages	Basic
	Mapping actors	Diagram identifying the principal actors/actor categories	Basic
		Diagram identifying the principal operational service providers/provider categories	Basic
		Diagram identifying the principal support service providers/provider categories	Basic
	Mapping volume and employment	Diagram outlining volume and employment distribution by actor/actor category and stage	Basic
	Mapping value distribution	Diagram outlining value distribution:	
		For selected value chain(s) within the market system	Basic
		For all value chains within the market system	Full
	Mapping costs and margins	Diagram outlining cost and margins:	
		For selected value chain(s) within the market system	Basic
		For all value chains within the market system	Full
	Mapping governance and linkages	Diagram outlining linkages and governance structures	Basic
	Mapping environmental impacts	Input/output tables for each process stage within the value chain(s) providing data for:	
		At least one indicator for two aspects	Basic
		All indicators for all aspects	Full
		Inventory table listing all identified environmental aspects	Basic
		Classification table for all identified environmental aspects	Basic
		Diagram outlining identified environmental impacts for each process stage	Basic
	Mapping decent work deficits	Diagram for each process stage within the value chain(s) outlining decent work deficits in relation to:	
		ILO core labour standards	Basic
		All Decent Work Agenda elements	Full
		Diagram outlining identified decent work deficits for each process stage	Basic

Section 3. Focused analysis and intervention design

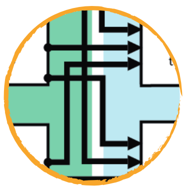


3.1 Identification of focus processes and actors

Figure 39. Actors and support service providers



The Primary Processing stage involves the greatest diversity of both primary and institutional actors



and more relational connections between input supply and production

Figure 40. Volume

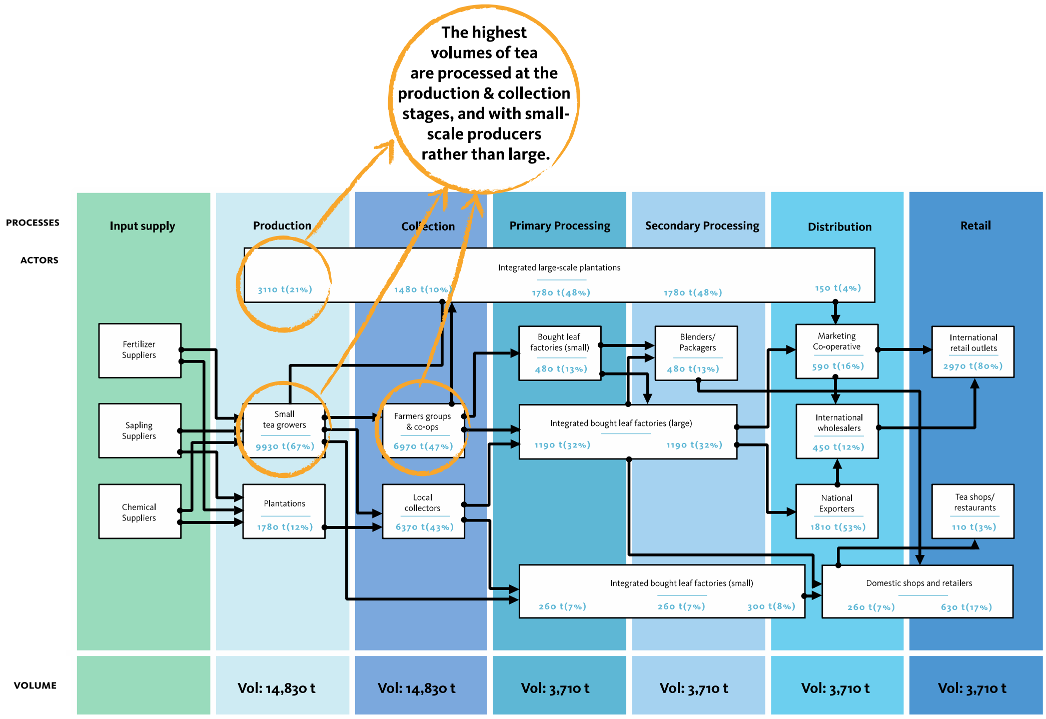


Figure 41. Employment

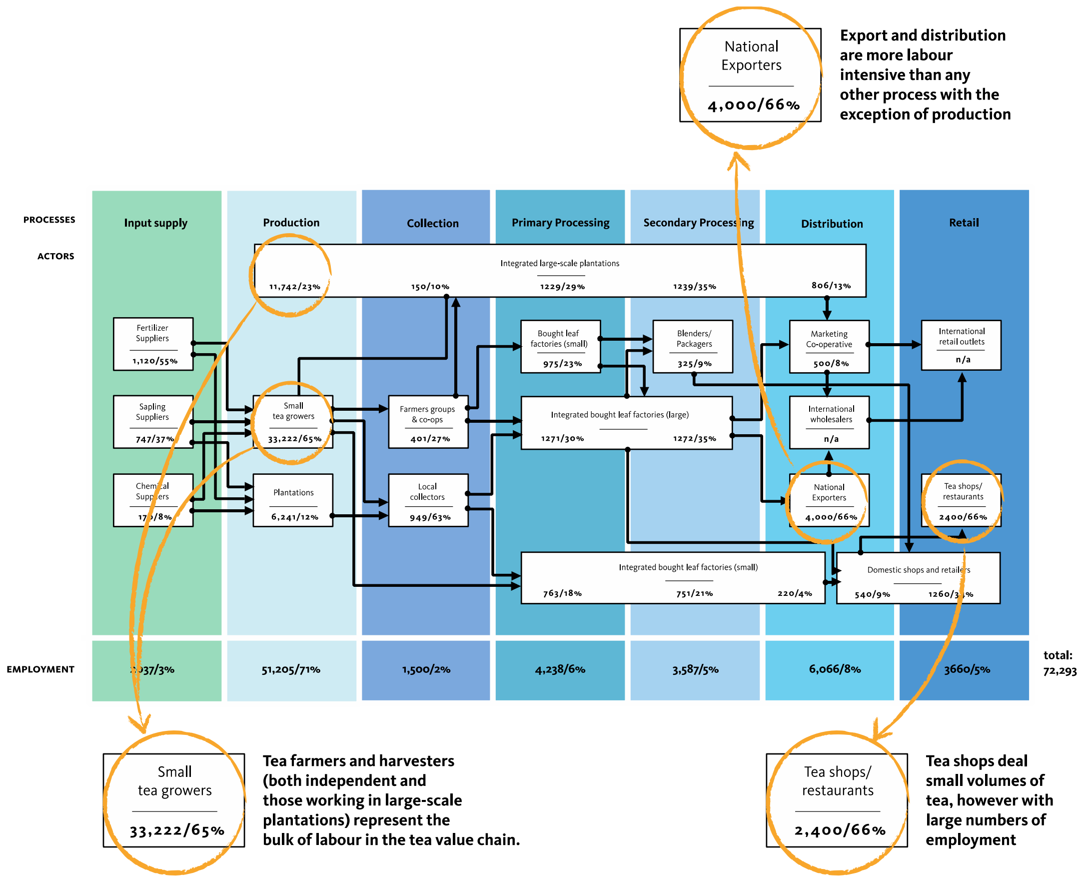
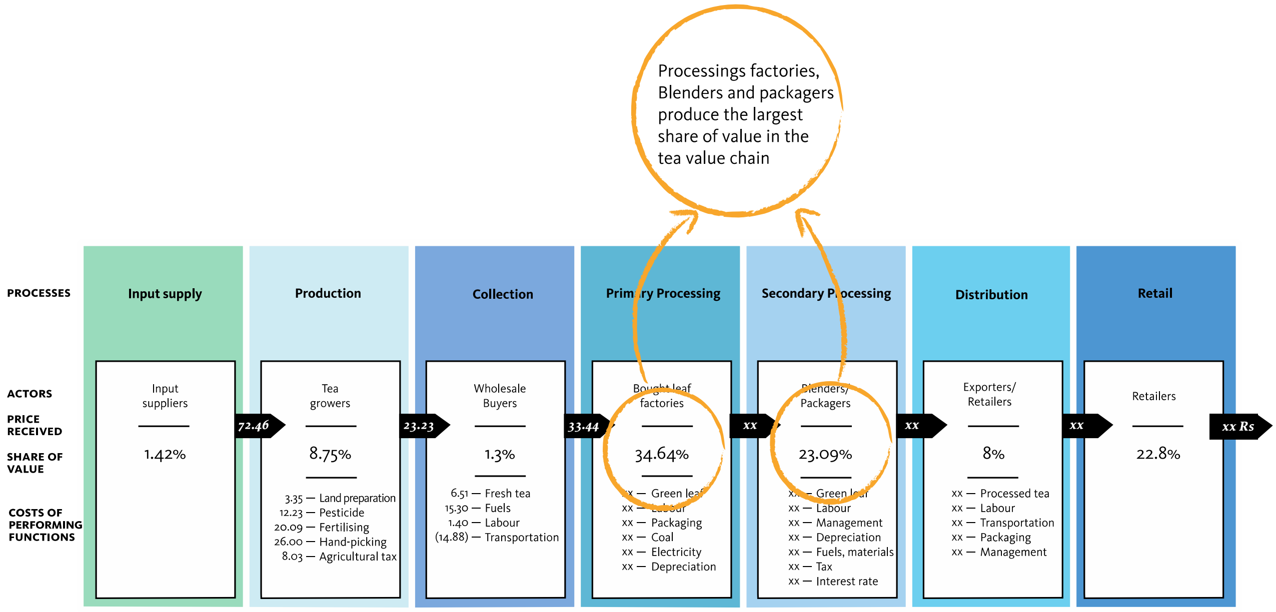


Figure 42. Amalgamated value capture, costs, and margin diagrams



3.2 Environmental and decent work prioritisation

Below are provided step-by-step details of the methodology for prioritising impacts. Note that this applies primarily to projects implementing the comprehensive methodology, and may not be relevant to projects applying the basic version (which already have priority focus areas during the data collection phase).

Step 1: Aspects significance assessment (individual stage)

Firstly, the significance of a given set of environmental and social aspects for each life-cycle phase is assessed individually. This assessment will cover all the environmental and decent work issues assessed in the initial value chain analysis and mapping phase. Following the participatory approach advocated by the ILO, the methodology outlined will integrate the views of enterprises, employees and other stakeholders into the assessment process. It will involve undertaking brief representative surveys with enterprises and workers at each value chain stage assessing impacts relevant to their specific stages, and surveys assessing all value chain stages with key stakeholders such as business membership organisations, regulatory agencies and worker's organisations.

The three stages of the initial aspect significance assessment are as follows:

1.3 The intervening organisations categorise the environmental and decent work issues identified into categories using a three-point High/Medium/Low (HML) scale (i.e. High Significance = 3; Medium Significance = 2; Low Significance = 1).

1.4 Enterprises and workers within the individual value chain stage are asked to categorise the environmental and decent work issues identified into HML categories using the three-point scale, with the average incorporated into the assessment table.

1.5 Stakeholders within the wider value chain are asked to categorise the environmental and decent work issues identified into HML categories using the three-point scale, with the average incorporated into the assessment table.

Table 12. Example of aspect significance assessment (individual stage)

Product chain:Orthodox tea Life cycle phase: Agriculture/Tea leaf production				
	Significance assessment			
	Intervening organisations	**Workers & enterprises**	**Stakeholders**	**Aspect significance**
Environmental aspects				
Resource use	3	1	2	3
Emissions to air	3	3	3	3
Emissions to water	1	1	1	1
Emissions to soil	2	1	2	2
Solid waste generation	1	1	1	1
Decent work aspects				
Adequate earnings & productive work	3	2	2	2
Decent hours	3	2	2	2
Combining work, family, & personal life	3	2	2	2
Work to be abolished	3	2	2	2
Stability & security of work	3	2	2	2
Equal opportunity & treatment in employment	3	2	2	2
Safe work environment	3	2	2	2
Social security	3	2	2	2
Social dialogue, workers, & employers' representation	3	2	2	2
Economic & social context for decent work	3	2	2	2

Step 2: Value chain stage significance assessment

Step 2 determines the relative significance which different value chain stages have on the environmental and social performance of the entire value chain assessed. This is determined on the basis of aggregate scores for each value chain stage, again following a HML method (1–3 scale). The range of aggregate significance scores is determined, on the basis of which is produced a grading scheme for stage significance.

Suggested stage significance grades are as follows:

Percentile	**Significance**
Bottom 33%	Low significance (1)
Middle 33%	Medium significance (2)
Highest 33%	High significance (3)

This grading scheme is applied to the value chain stages assessed to produce the value chain stage significance assessment.

Table 13. Value chain stage significance assessment

Product chain: Orthodox tea					
	Life cycle phase				
	Input supply	**Production**	**Collection**	**Primary processing**	**Secondary processing**
Relative phase significance	3	3	2	2	3

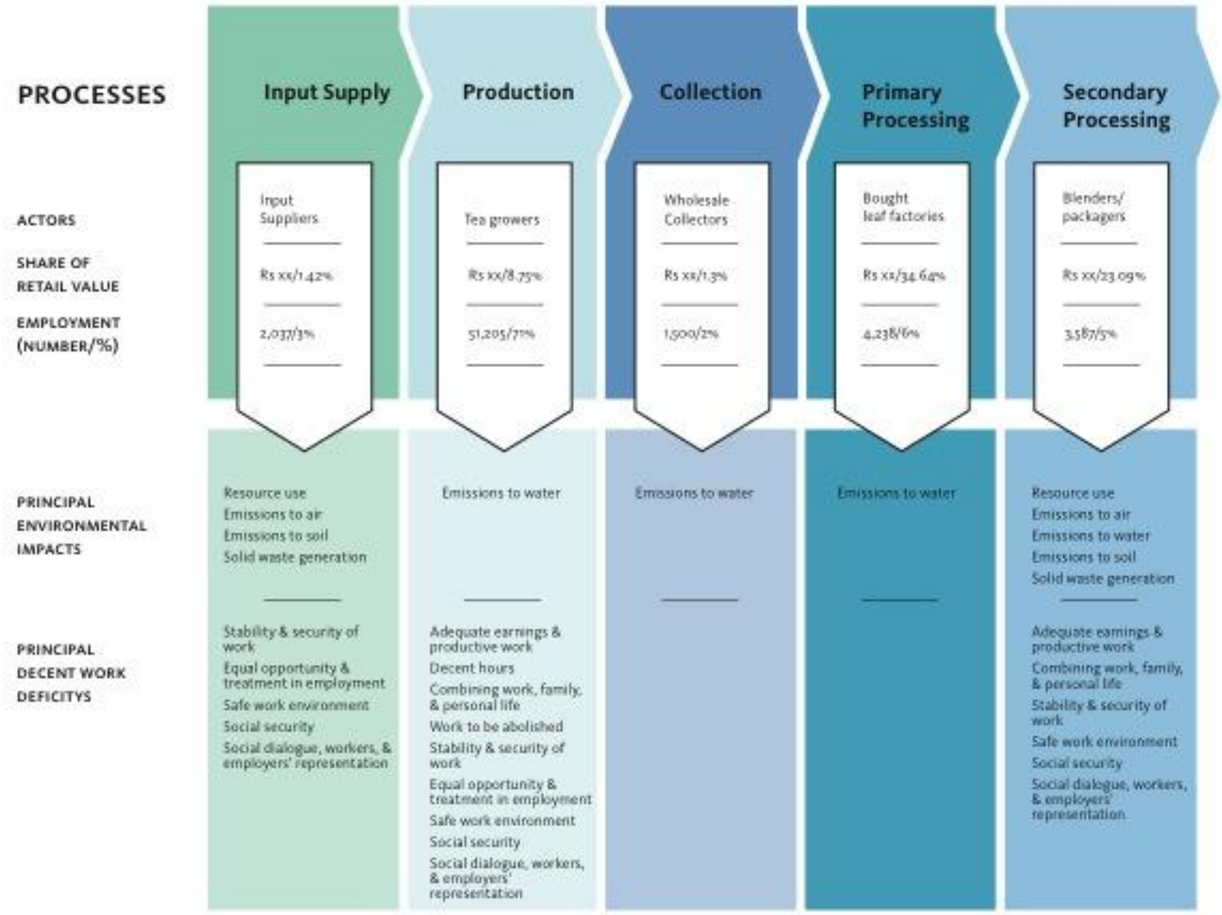
Step 3: Hot spot identification

In Step 3, the grading of the environmental and decent work aspects significance assessment for the individual stages is combined with the value chain stage significance assessment in order to identify the most important "hot spots". This is achieved by integrating the individual value chain stage assessment with the assessment of stage significance within the overall value chain. Hot spots for each stage are identified by multiplying the aspect score for individual value chain stages with the stage significance score. The resultant score for each aspect will be in the range of 1 to 9. The aspects scoring within the range 6 to 9 are considered hot spots.

Table 14. Identification of impact hot spots

Product chain:Orthodox tea					
	Life cycle phase				
	Input supply	**Production**	**Collection**	**Primary processing**	**Secondary processing**
Environmental aspects					
Resource use	9 (3x3)				6 (2x3)
Emissions to air	9 (3x3)				9 (3x3)
Emissions to water		9 (3x3)	6 (2x3)	6 (2x3)	9 (3x3)
Emissions to soil	6 (2x3)				6 (2x3)
Solid waste generation	6 (2x3)				9 (3x3)
Decent work aspects					
Adequate earnings & productive work		9 (3x3)			6 (2x3)
Decent hours		9 (3x3)			
Combining work, family & personal life		9 (3x3)			6 (2x3)
Work to be abolished		6 (2x3)			
Stability & security of work	6 (2x3)	6 (2x3)			6 (2x3)
Equal opportunity & treatment in employment	6 (2x3)	6 (2x3)			
Safe work environment	6 (2x3)	6 (2x3)			6 (2x3)
Social security	6 (2x3)	6 (2x3)			6 (2x3)
Social dialogue, workers & employers' representation	6 (2x3)	6 (2x3)			6 (2x3)
Economic & social context for decent work					

Figure 43. Prioritisation of aspects within stages for further analysis



3.3 Analysis of opportunities and constraints

Box 4
The role of participation in intervention design and implementation

Participation is central to the Green Jobs value chain approach, and various participatory approaches can be used to present your findings and proposals and get feedback in order to further refine them. In employing participatory tools to develop and assess proposed interventions, it is important to distinguish between means and ends. The role of the intervening organisations is to undertake an objective appraisal of the deficits, constraints and opportunities existing within a given value chain, and to develop and implement an intervention strategy that addresses these in the most effective way possible. Within this process, participation is primarily useful in two ways:

- Providing information on existing conditions and potential upgrading options and challenges.
- Improving the potential for success by increasing ownership and contribution from value chain actors.

In recognising the value of participatory approaches to intervention design, it is important to emphasise that these should be undertaken instrumentally, with a view to improving intervention design and implementation. It is frequently the case that few (if any) actors within a value chain will possess the strategic view across stages which the intervening organisation possesses. Pressure to deliver immediate results or support sectional interests can potentially lead to the selection of inappropriate or short-term intervention strategies, and an undue focus on participation as a process can dissipate time and resources without delivering tangible change within the sector. Projects should therefore attempt to ensure that, where adopted, participation processes inform, legitimise and support project interventions, without unduly compromising their effectiveness.

Box 5
Some key principles of intervention design

Focus on a long-term industry vision and maintain a systemic perspective

End goals and a long-term vision for the industry should guide the design and implementation of value chain development projects. Results in the short term are important for building trust and instilling confidence amongst stakeholders, but a project design that does not keep in mind longer-term objectives is unlikely to see the desired results from its interventions. Rather than simply benefiting a few actors directly, the industry vision should be developed with a broader perspective in mind, and should attempt to bring about systemic changes in the value chain.

Assess resources and consider the scale of impact

Donor resources are always limited and their strategic and optimal allocation is of vital importance to a project's success. Facilitators should conduct an intensive and realistic assessment of the resources at their disposal (including opportunities for resource leveraging and cost sharing with value chain actors) and should analyze expected impacts in relation to the investment needed in order to make optimal use of the resources. Scale of impact, in terms of the number of beneficiaries as well as the spread and continuity of benefits, should be an important consideration for facilitators and donors. Rather than focusing on short-term immediate impact, facilitators should assess the expected scale of impact of their interventions over the longer term.

Build flexibility into project design and implementation

Market conditions and the contexts in which value chains operate are often very dynamic. Furthermore, the achievement of sustainable and competitive value chains is not a fixed point; rather, it is an ongoing process in response to a constantly changing environment. For these reasons, flexibility in project design and implementation is critical to successful outcomes. Projects cannot and should not assume a simple and predictable progression during design and implementation, and need to build in flexibility to their designs and management systems if they want to achieve successful outcomes. Facilitators need to be open to continual learning, and should employ an 'action-learning' strategy that reflects upon lessons being learned and incorporates these lessons into the ongoing process of project implementation.

Adapted from United States Agency for International Development (USAID) microlinks tools, www.microlinks.org [accessed 29 Nov. 2013].

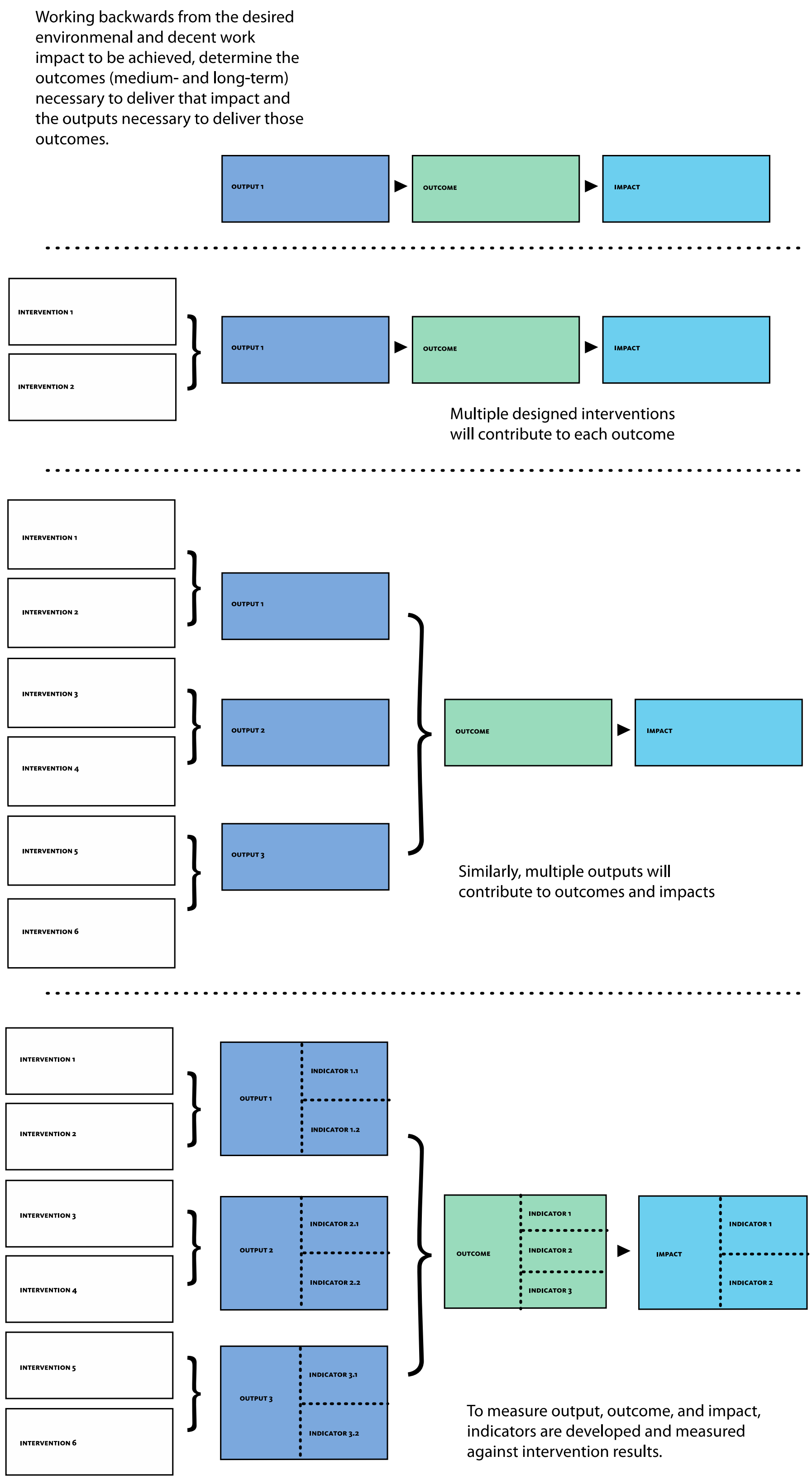
Control points

No.	Control point	Compliance criteria	Level
	Significance assessment	Table outlining aspects significance assessment (separately for each selected stage), including:	
		Project significance assessment.	Basic
		Partner (worker and enterprise) significance assessment.	Full
		Table outlining full value chain aspects significance assessment.	Basic
		Table identifying key environmental and decent work impacts.	Basic
	Assessing current and potential performance	Diagram outlining identified Key Performance Indicators (KPIs) and benchmarks for selected stages.	Basic
		Diagram outlining performance gaps for selected stages.	Basic
		Table outlining qualitative analysis of value chain technologies and operating environment.	Basic
	Assessing and selecting options for intervention	Outline of value chain development objectives, including diagram detailing targeted outcomes and impacts.	Basic
		Table identifying principal intervention options.	Basic
		Table outlining outcomes of prospective assessment and identifying selected intervention options.	Basic
Results chains			
	Articulating results chains for selected interventions	A documented results chain for each intervention selectedshowing how the selected intervention(s) lead to achievement of development goals. All key levels of the results chain assessed quantitatively and/or qualitatively. Clear documentary evidence of research and analysis underlying the logic of the steps in the results chain(s) explaining how changes lead to lasting impact. Significant assumptions explicitly identified.	Full
	Building familiarity of mid and senior level programme staff with the results chain(s)	Ability of programme staff to describe the respective results chain(s) covering their work. Examples of how to use the results chain(s) to guide decision-making.	Full
	Association of relevant indicators with outcomes described in the results chain(s)	Relevant quantitative and/or qualitative indicators for each outcome in the results chain(s).	Full
	Association of relevant indicators with impacts described in the results chain(s)	Universal impact indicators included in the results chain or written justification is provided for each such indicator not included.	Full
	Assessment of lasting impact	Qualitative and/or quantitative, intermediate indicators to provide information on the likelihood that outcomes described in the results chain(s) will continue after the programme ends.	Full

Section 4. Monitoring and evaluation

4.1 Results chain development

Figure 44. Building up the results chain in stages



4.2 Impact assessment matrix

	Description	Key performance Indicators	Baseline	Target(s) (provisional/ final)	Source	Data Platform	Measured by	Frequency	Notes
	Description of the result being measured	**Quantitative indicator**	**Baseline indicator value**	**Target indicator value**	**Source/ measurement mechanism, including baseline if different**	**Method of data capture and recording**	**Identification of allocated responsibility for data collection**	**Frequency of measureme nt and reporting**	
Inputs	1. 2. 3. …	1. 2. 3. …	n/a	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …
Outputs	1. 2. 3. …	1. 2. 3. …	n/a	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …
Outcomes	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …	1. 2. 3. …
Impacts	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.

Control points

No.	Control point	Compliance criteria	Level
	Baseline information on key indicators is collected.	A clear plan is in place, based on good practice, to gather baseline information, or if necessary to construct baseline information retroactively. **Use:** The programme has collected baseline information and outlined the status of key indicators before activities have led to changes.	Full
	All research is in line with established good practices (in terms of research design, sampling, quality control etc.).	The plan to measure indicators conforms to established good practices. **Use:** The programme can demonstrate that research conducted conforms to established good practices. **Use:** Those involved in the research (both inside the programme and any external contractors) can explain how research was conducted; the questionnaires used are made available, etc.	Full
	A clear and appropriate system for estimating attributable changes in all key indicators is in place.	The programme has documented plans for estimating the attribution of observed changes to programme activities. The methods used are appropriate to the programme context, link back to the results chain and conform to good practice. The methods chosen distinguish, where possible, the programme's impact from the impact created by other programmes working in the same area. **Use:** The programme can provide evidence that the methods for attribution were applied in the research conducted.	Full
	Where the measured changes are due in part to the work of other, publicly-funded programmes, then those contributions are acknowledged.	All public programmes (donor and government) which have contributed to the changes claimed are acknowledged.	Full
	Costs are tracked annually and cumulatively.	An accounting system is in place to track costs and produce annual and cumulative totals of all programme-related costs spent in country. **Use:** The programme has annual and cumulative totals of all programme-related costs spent in country.	Full
	The programme documents estimate changes in key indicators due to the programme at least annually (N.b. external publication remains at the discretion of the programme; see also 7.6).	The programme's system describes how such reports will be produced at least annually. **Use:** The programme has a report(s) produced in the last year which provides clear estimates of the changes in key indicators due to the programme. It should also outline the context, and any qualitative information needed to understand the numbers presented.	Full
	Reported changes in key indicators are disaggregated by gender.	All reported changes in key indicators, and particularly in impact indicators, are disaggregated by women and men. Where figures are not disaggregated, justification is provided as to why this was not possible or appropriate.	Full
	Costs are reported together with impact.	Annual and cumulative totals of all project-related costs spent in country are reported in at least one report in the last year.	Full

A clear and reliable system for measuring key indicators at appropriate intervals is established.	The programme has documented the system for measuring changes in key indicators, including: · What information will be gathered for each key indicator? · How the information will be gathered. · How each key indicator will be calculated or described. At what interval each key indicator will be measured or assessed.	Full
Tasks and responsibilities for impact assessment have been specified	Tasks and responsibilities in relation to results measurement are documented. Staff are able to accurately describe their responsibilities in results measurement.	Full
The system is supported by sufficient human and financial resources.	The program can show that sufficient human and financial resources have been allocated to manage and implement the results measurement system.	Full
The system is institutionalised.	**Use:** Evidence exists of the system having been institutionalised, for example in the form of a staff manual on results measurement, job descriptions, inclusion in staff performance reviews etc.	Full
The results measurement system is organised to facilitate external audit	A summary sheet lists the control points in order, and lists, for 'Musts', the document(s) that provides evidence of compliance	Full

Section 5. Case studies: Learning from green jobs interventions

Case study 1: Brick industry (Viet Nam)

Organisations: Swiss Agency for Development and Cooperation (SDC)/Nam Dinh Provincial Government

Location: Viet Nam

Background

The Vietnam Sustainable Brick-making Project (VSBP) is a partnership between the SDC and the provincial government of Nam Dinh Province, located some 90 km south of Hanoi. The region is a centre of brick production due to its location in the Red River delta and attendant clay resources, with more than 600 brick kilns currently operating.

The brick industry in Viet Nam is traditionally highly labour-intensive and employs hundreds of thousands of unskilled and semi-skilled workers. It is estimated that Viet Nam consumes over 20 billion bricks per year — almost 250 bricks per capita — and brick production in Viet Nam consumes some 2.2 million tonnes of coal per year. Within the sector, 10,000 traditional brick kilns are still in operation and are heavily polluting the environment. They have very high energy consumption (coal and firewood) and often exhibit poor working conditions. Traditional brick kilns are seasonally and batch operated. They work in the dry season, use the topsoil of agricultural land and are fired in batches (as opposed to continuous kilns).

Brick factory, Viet Nam

Brick kiln, Viet Nam

Batch operated kilns are by definition less energy efficient than continuous kilns, as the heat generated can neither be used for pre-heating new bricks nor for cooling the fired bricks, leading to extremely high emissions of carbon dioxide and other gases relative to output. Fluorine and sulphur gases emitted by the brick kilns create severe local air pollution problems, damaging surrounding rice fields and other crops and leading to high compensation payments. To address these environmental problems, the government of Viet Nam decided to modernise the brick industry. In 2001, it decreed that traditional brick-making would be eliminated from urban areas by 2005 and phased out entirely by 2010. Replacing these traditional kilns with capital-intensive tunnel kiln technologies would not only substantially reduce employment opportunities (some 24 out of 25 jobs would become obsolete), but would also be in contradiction with the economic production factors where capital is scarce and labour abundant. The partnership therefore aimed to develop and promote intermediate solutions in order to both improve environmental performance and promote inclusive social development.

Research and intervention strategy

At the outset of the project, policy application was hindered by the lack of reliable information on a number of areas including brick-making processes, clay resource availability and use, energy efficiency, kiln emissions, general local environmental impacts and enterprise economics. Authorities had limited contact with brick-makers and — besides the unpromising prospect of attempting to close traditional units — they could propose no technical alternatives for improving the environmental performance of brick-making. Finally, the authorities lacked practical instruments for enforcing regulations and guiding development processes.

The partnership therefore began with an extensive series of diagnostic studies to establish an adequate basis for further work. Then, through a programme of workshops, seminars, forums, training courses and study tours, it built up contacts and mutual trust to establish a platform for exchange and cooperation that encompassed all stakeholders — large- and small-scale brick-makers, as well as provincial and district authorities. The subsequent intervention strategy contained several components, including development of a pilot Vertical Shaft Brick Kiln (VSBK) enterprise and generation of performance data through comprehensive monitoring for an objective assessment of VSBK technology; the provision of technical support for tunnel kilns and VSBK improvements directly to entrepreneurs; and continuous policy dialogue and capacity building activities with provincial and national government.

Project interventions

Project interventions involved the identification and testing of options concerned the entire cycle of brick production, including clay extraction, green brick production and firing processes, as well as production organisation and business management. Additionally, options were identified that provided authorities with more effective methods, equipment, and capacities for state management functions such as: emissions measurement, environmental monitoring, clay resource management, planning, and promotion of development in the brick-making industry. In all of these areas, a demand-driven approach was applied involving authorities and private brick-makers in a process of assessing existing problems, identifying options, and developing appropriate technical and organisational solutions.

In practical terms, the project developed a pilot VSBK kiln following an improved design (incorporating modifications in the flue gas system and chimneys, and use of a hydraulically operated unloading system). The unit also included a de-airing extruder to mould hollow bricks, and an adequately-sized drying shed to ensure an uninterrupted supply of dried green bricks to the kiln even in the rainy season. Alongside development of the pilot kiln, the project has also undertaken a series of technical and organisational measures to improve the economic efficiency and environmental performance of tunnel kilns. Experts were contracted to analyse the process and recommend improved operating methods, resulting in the development and dissemination of best practice guidance.

As part of the project, the following training courses were also provided:

- Brick-makers and technical staff training course — this eight-day course was held twice with a total attendance of about 100 participants. The curriculum covered a range of subjects including: labour protection and safety; equipment and technology; brick-making techniques; and management skills.
- Production supervisors training course — the five-day course was held once with around 70 participants. Training modules dealt with: production techniques; quality control; trouble-shooting; energy efficiency; and management functions.
- Directors' forum — three, two-day forums were attended by 45 directors and owners of brick enterprises. Based on participant priorities, the subjects covered included: investment decisions and enterprise expansion; technology and product design; planning and management of the enterprise; clay exploitation; environmental impacts; production economics and cost efficiency; sales management; and human resource management.

As part of the training and technical support programme, printed guidelines and tools were prepared for brick-makers including: enterprise economics and financial planning guidelines; credit application template; VSBK manual; and guidelines for mitigating the environmental impact of brick-making. Documentation was also produced on a "model VSBK enterprise", including: plant layout; construction plans; financial planning format; registration and legalisation procedures. This material has been distributed to all participants in the training courses, and to a range of external stakeholders. Finally, technical assistance in the field was provided to brick-makers to assist them in solving practical problems associated with technical innovations.

Outcomes

The partnership has identified and tested technical and organisational options for brick-making that are environmentally sound, economically viable and, at the same time, accessible to small-scale producers. It has been successful in introducing viable intermediate technologies to overcome the dichotomy between choosing either traditional, polluting kilns with investments in the order of US$10,000 to 35,000, and modern tunnel kilns with an investment of several million dollars. The project has contributed to the development of improved tunnel kilns with substantially reduced investment costs (from several million to less than US$500,000), which can be operated by the private sector and offer improved energy efficiency and better working conditions. The number of tunnel kilns in Nam Dinh Province has more than doubled in three years, from 11 to 25, an outcome facilitated in part by the project's activities. The project has also assisted in the development of a model VSBK project to prove the technology, facilitating the widespread take-up of the VSBK technology (over 300 kilns now operational).

The partnership has also played a crucial role in the development of an informed, pro-active and participatory approach to state-management of the brick-making sub-sector. Provincial authorities have recognised that more effective management requires the decentralisation of certain regulatory and support functions to the district and commune levels. Furthermore, it has become apparent that an extensive shift out of traditional brick-making cannot be left to the individual decisions of small-scale producers alone. It needs to be promoted within the framework of local, community-managed development.

Specific decent work and environmental outcomes identified include the following:

Decent work:

- Improved incomes — the income of the workers has increased as much as fourfold as brick kiln employment is now available all year round.
- Improved working processes — green brick-making has been improved by selective mechanization such as a winch loading system, small extruders and hydraulic unloading systems, substantially reducing drudgery.
- Improved occupational health — through the introduction of air flow control devices on VSBK, workers are no longer exposed to toxic flue gases such as carbon monoxide and sulphur oxide while loading the kiln.
- Supporting small-scale/labour-intensive production — the partnership has provided viable intermediate technical solutions with substantially higher labour intensity that fully automated (and thus capital intensive) technological solutions.

Environment:

- Reduction in flue gas emissions — toxic flue gas emissions which were damaging crops and the health of the local population have been substantially reduced through improved design and operating practice.
- Reduction in CO_2 emissions — a single vertical shaft brick kiln reduces greenhouse gas emissions by between 40 to 60 per cent relative to a traditional kiln. The >300 VSBKs currently operating are therefore reducing CO_2 emissions by 150,000 tonnes per annum.
- Reduced resource use — traditional kilns use the topsoil of agricultural lands. A systematic mapping of clay resources now allows for the sustainable use of clay. This has led to improved brick quality and less competition with agriculture. The VSBK design also requires significantly less coal than traditional kilns (as little as 110 grammes, compared to up to 500 grammes for traditional kilns), thus substantially reducing resource use.
- Hollow bricks — while traditional kilns can produce only solid bricks, modern kilns can produce hollow bricks that consume much less energy for firing, use 40 per cent less clay, and have much better insulation standards. Better insulation can lead to considerable energy saving over the lifespan of a brick if the energy spent on heating and cooling can be reduced, leading to substantial indirect reductions in CO_2 emissions and resource use.

Lessons learnt

The project has generated several lessons for similar future intervention projects. Firstly, the importance from a project perspective of engaging closely with (or, in this case, working in direct partnership with) regional and national government and regulatory bodies, both to understand their current approaches to a given industry, and to improve their ability to engage with and shape its development.

Second, that the development of technological solutions to environmental and decent work challenges requires sustained involvement with an industry, and recognition of the project organisations as trusted and credible partners in sector development. Third, that this may require the development of a pilot initiative or enterprise in order to assess and demonstrate improved technologies and operating practices to business owners, workers and government bodies alike.

Fourth, that appropriate technical solutions are crucial, but not sufficient to achieve policy objectives— these require the creation of a wider enabling environment for sustainable sector development involving the institutional anchoring, scaling-up, and dissemination of solutions, techniques and programmes that have been developed and piloted by the project.

Finally, that an extensive shift to more sustainable technologies and practices within a traditional industry such as brick-making cannot be left to the individual decisions of small-scale producers alone, but instead needs to be promoted within the framework of local, community-managed development, underpinned by strong, sustained and participatory engagement by local and national authorities.

Adapted from UNDP/SDC (2008), http://www.swiss-cooperation.admin.ch/laos/en/Home/Programmes/Rural_Livelihood_and_Natural_Resource_Management/Vietnamese_Sustainable_Brick_making [accessed 29 Nov. 2013].

Case study 2: Glass industry (India)

Organisations: SDC/The Energy and Resources Institute (TERI)

Location: Northern India

Background

In 1991, the SDC established a Global Environment Programme to support developing countries in implementing measures aimed at protecting the global environment. In pursuance of this goal, SDC India, in collaboration with Indian institutions including The Energy and Resources Institute (TERI), conducted a study of the small-scale industrial sector in India to identify areas in which to introduce technologies that would improve energy efficiency and reduce greenhouse gas emissions, while also contributing to social development goals. Four energy-intensive small-scale industrial sectors were selected for intervention, one of which was the small-scale glass industry cluster located in Firozabad, near Agra.

Firozabad glass factory

The Firozabad glass industry provides a source of livelihood to over 150,000 people and produces an estimated 2,000 tonnes of glass products daily, including around 50 million bangles (the majority of the country's production). These glass products are mainly low-value items. The bangle-making industry comprises tier upon tier of units whose activities are closely interlinked. At the apex are open pot furnace units that produce molten glass and 'raw' bangles; below them are thousands of household-level units in which these 'raw' bangles are processed; finally there are hundreds of muffle furnace (pakaibhatti) units in which the processed bangles are annealed to yield the finished products.

Traditionally, the pot furnaces and muffle furnaces operated on coal, and were marked by low energy efficiency and high levels of emissions. An energy audit undertaken at the inception of the project found that the glass industry in Firozabad consumes in excess of 250,000 tonnes of coal per year, generating substantial greenhouse gas emissions and very high levels of local air pollution including respirable suspended particulate matter (RSPM), suspended particule matter (SPM), sulphur dioxide and nitrogen oxides. The effects of this pollution were all the more serious because many of the operating units were located in the midst of densely populated residential areas of Firozabad. Working conditions in the sector were also extremely poor, with employees working in the furnace units exposed to very high levels of pollution, extreme heat, cramped working conditions and a range of other health and safety hazards. Workers in the industry are often badly paid, working long hours with few benefits. Until recently, there were few or no mechanisms of collective organisation or representation. Within the cluster, child labour continues to exist in the household bangle-making sector, alongside extremely poor working conditions and levels of pay.

Research and intervention strategy

SDC and TERI, in partnership, intervened in the Firozabad cluster with a focus on introducing clean, energy-efficient technologies for the pot and muffle furnaces, thereby reducing emissions, curbing resource use and improving working conditions. This goal assumed particular significance in 1996, with the Supreme Court of India ordering industrial units in the area known as the Taj Trapezium zone — including the Firozabad pot furnace units — to stop burning coal and instead use natural gas as fuel. Having considered all of the above issues, SDC and TERI structured their research and intervention programme as a package of parallel and ongoing measures (listed below):

- Perform audits on existing furnaces, including assessing current levels of energy efficiency and related issues (including furnace design, fuel quality and existing operating practices).
- Search for suitable solutions to achieve the benchmarks set for energy efficiency and environmental performance.
- Develop and demonstrate an improved technology, in terms of energy and environmental performance and other parameters. Fine-tune the developed technology for wider dissemination.
- Help other units to upgrade and adapt their existing technologies as required.
- Seed the market (i.e. help make the technologies available via local suppliers); promote measures to reduce their costs and increase their uptake.
- Conduct studies on the existing socio-economic conditions in non-furnace operating units such as household processing.
- Devise and implement strategies for the improvement of working conditions in household processing units.
- Increase the number of partners and collaborators in the field, and strengthen their capabilities by ongoing human and institutional development in order to promote dissemination of improved technology and working practices.
- Make efforts to establish a regular policy dialogue between various players in each area (industries, institutions, government bodies, etc.).
- Identify new areas for research and development (R&D) activities, for future interventions.

Project interventions

As outlined above, SDC/TERI undertook a wide range of project interventions, with the primary initial focus on improving the energy efficiency and environmental performance of furnaces used within the cluster. The results of the energy audits undertaken clearly showed that all the furnaces – in particular, the coal-fired pot and muffle furnaces – were very low in energy efficiency, primarily due to two reasons: poor furnace design, and little or no heat recovery. Given the unique characteristics of the furnaces found within the cluster, the project decided to design, fabricate, and demonstrate an improved gas-fired pot furnace with a recuperator (heat recovery system) that would reuse heat from flue gases, and an improved gas-fired muffle furnace.

By 2001, SDC/TERI had succeeded in developing and demonstrating two cleaner, energy efficient technologies based on natural gas for the glass industry: the energy efficient recuperative gas-fired pot furnace, and the gas-fired muffle furnace. Following this, efforts were focused on incremental improvements to furnace design and installation (including research on reduced-cost materials and processes to facilitate replication), dissemination of improved technologies (including technical support and worker retraining), and also on undertaking a number of pilot social action initiatives to improve the lives of workers in the household-level units that process bangles and other decorative items.

These included an initiative to improve working conditions by promoting the relocation of household bangle-processing units to a common workshed, thereby reducing pollution and improving living conditions in their dwellings. With the project's support, self-help groups (SHGs) were formed among processing workers in a pilot locality and work was shifted to a rented workspace, with a crèche provided nearby to care for worker's children. To encourage adoption, workers were also offered slightly higher wages. Further social action projects included an initiative to promote the formation of cooperatives amongst workers engaged in glassware production, and a campaign to raise awareness of occupational health issues among household-level workers.

Glass bangles, India

Outcomes

Despite numerous barriers, the project was successful in promoting the adoption of the recuperative pot furnace model in Firozabad. By 2008, more than 40 pot furnaces based on the TERI design were operating in the cluster, representing a penetration level of close to 50 per cent. Although the project also successfully developed a more efficient gas-fired muffle furnace, long-term take up of this design has been less successful, with replications going from a high of 78 operational furnaces by mid-2005 to a low of less than 15 by end 2007 (out of a total of 107 installed) as higher gas prices and inadequate supply infrastructure led to the re-adoption of coal by the majority of operators.

Specific decent work and environmental outcomes include the following:

Decent work:

- Improved working processes — improvements in operating processes result in improved working conditions (including decreased exposure to extreme temperatures and improved ergonomics) for furnace employees.
- Improved occupational health — the development and adoption of the energy efficient furnace design has led to improvements in occupational health within furnace units by reducing air pollution.
- Skills development — the project has provided training and skills development support to workers in a range of activities including masons, furnace operators and employees of various service providers.
- Awareness raising — the project has contributed to raising awareness of occupational health issues among household-level workers.

Environment:

- Reduction in CO_2 emissions — as a result of the adoption of pot furnaces based on the project design, by 2008 a reduction in carbon dioxide emissions equivalent to 70,000 tonnes per annum had been achieved.
- Reduction in particulate and other emissions — adoption of energy efficient project-designed furnaces has also resulted in substantial reductions in emissions of other gases and particulate matter.
- Resource use — increases in energy efficiency have substantially reduced resource use per unit of output, with the project furnace requiring less than half the energy per kilogram of molten glass compared to the traditional coal-fired furnace design (2,455 kcal/kg melt, as opposed to 5,868 kcal/kg melt), and more than 30 per cent less than the retrofitted gas design adopted by some units (3,720 kcal/kg melt).

Alongside specific intervention outcomes, the project has spurred independent private-sector development and adoption of recuperative technologies in processes outside the immediate remit of the project (for example in auxiliary furnaces used to convert glass melt to finished products) — evidence of a substantial positive change in proprietor's and worker's attitudes to the adoption of new technologies and processes. The project has also succeeded in initiating dialogue among various stakeholders, at both cluster and policy levels, on a number of issues including energy efficiency, fuel supply, and the socio-economic conditions of the workforce.

Despite these successes, the pilot intervention to improve working conditions in the household bangle-processing units proved unsustainable — dwindling membership (due in part to social customs and cultural barriers which made it hard for women to move out of their homes), the hostility of the thekedars (labour intermediaries), the indifference of glass factory owners, and difficulties in day-to-day management meant that the common workshed could not achieve a sustainable level of profitable operation even with support from the project, and was eventually closed.

Lessons learnt

SDC and TERI's experience in Firozabad, as in other small-scale industrial clusters over the past decade, demonstrates that in order to achieve improved environmental outcomes in terms of increased energy efficiency and reduced carbon dioxide emissions in a highly dispersed sector, it is extremely important to develop cluster-specific intervention programmes with clearly defined objectives.

The Firozabad experience also highlights the fact that small-capacity users of energy, such as pakaibhatti (muffle furnace) operators and household-level processing units, find it very hard if not impossible to access cleaner fuels at affordable prices on a sustainable basis. At the policy level, these difficulties have been further compounded by shortages in availability of natural gas; an uneven pricing formula for gas; and the continued availability of coal in the cluster at relatively low prices. The widespread adoption of the larger pot furnaces has, however, demonstrated clearly that market-determined fuel pricing positively influences the adoption of energy efficient technologies, and that a sustained techno-social intervention programme can achieve substantial improvements in environmental outcomes (especially when coupled, as in this case, with the positive changes to the external regulatory and market environment).

The failure of one of the project's principal interventions within the bangle-processing stage of the value chain (the relocation of household units to a common workshed) served to demonstrate the complex social, cultural, and economic realities that governed the bangle-making community in Firozabad, posing a formidable barrier to any social action initiative that involved changes in the established pattern of work.

This ties into the wider lesson of the importance of working with tradition — engagement with the cluster led to the realization that, at times, tradition and custom wield far more influence than improved process or technology, and require patient and creative integration into project planning and implementation processes. The project also demonstrated the central importance of a sustained field presence in successful outcomes — the funding partner (SDC) has a principle of long-term engagement in its funding programmes, enabling the formulation of flexible, participatory schemes and programmes that were able to run for extended durations.

Adapted from Sethi, G.; Ghosh, A. 2008. *Towards cleaner technologies: A process story in the Firozabad glass industry cluster* (New Delhi, TERI).

Case study 3: Successful implementation of green policies (Malaysia)

Malaysia has made strides towards greening its economy in recent years through concerted efforts to scale up renewable energy market penetration. In 2009, the government incorporated a green technology portfolio into federal administration through the establishment of the Ministry of Energy, Green Technology and Water (KeTTHA). Under KeTTHA's authority, the country's National Green Technology Policy of 2009 was developed with a view to strengthen institutional and policy coherence and promote market development of green technology in Malaysia.

In line with these objectives, Malaysia's Green Technology Financing Scheme was launched in 2010 to create a policy environment that would attract innovators and users of green technology. It includes a US$470 million soft loan to companies (both technology developers and technology users) with credit guarantees of up to 60 per cent of the loan amount; the government absorbs 2 per cent of the interest rate. This complements the country's 2011 Renewable Energy Act, which sets a target of 6 per cent (985 megawatts) of the national energy mix to be generated from renewable sources by 2015, and 11 per cent (2 gigawatts) to come from renewable sources by 2020.

An important feature of the Renewable Energy Act is the introduction of a feed-in-tariff aimed at catalyzing renewable energy market development. Tariffs have been set between 0.85–1.23 Malaysian Ringgit (MYR) per kilowatt-hour (/kWh) (US$0.28–0.40/kWh), depending on the system size, with an annual digression rate of about 9 per cent, based on expectations of reduced costs. The scheme is being financed through a national renewable energy fund accrued by setting a 1 per cent levy on all electricity users consuming over 300 kWh of electricity per month. This works to ensure that renewable energy projects remain financially viable and revenue returns are commensurate with current costs.

Since the implementation of the feed-in-tariff, there has been significant development in Malaysia's renewable energy landscape. To date, 43.9 megawatts of total installed capacity have been approved, with an additional 348.57 megawatts anticipated in 2014.

In addition to expanding renewable energy generation, Malaysia's green initiatives have also been successful in attracting higher value added foreign investment, contributing to the country's economic growth. Several leading multinational enterprises involved in the manufacture of solar panels and equipment, including First Solar (United States), Q Cells (Germany), Sunpower (United States) and Panasonic (Japan) have established operations in Malaysia, adding to the country's growing status as a solar manufacturing hub. According to government estimates, Malaysia's green industries grew by six per cent between 2010 and 2011. Following this growth pattern, the government projects that renewable energy will generate US$23 billion in economic activity by 2020, support 50,000 jobs while at the same time reducing greenhouse gas emissions by roughly 40 per cent.

Given that micro, small and medium enterprises account for upwards of 99 per cent of business establishments in Malaysia, the government also launched its "MyHijau SME programme" in 2012. Designed to build the capacity of small and medium-sized enterprises (SMEs) to manufacture green products, the programme provides technical consultation and training for up to two years with the aim of preparing the industry for eco-labeling certification.

As the above examples illustrate, Malaysia is advocating the right policy mix — including the effective use of market based instruments, targets and standards — to expand green market opportunities, create jobs and promote energy security, thereby ensuring that the country's continued economic growth does not come at the expense of long-term environmental sustainability.

Annexes

Annex I. Accessing climate finance for green jobs development

Table A1. Greenhouse gases, global warming potential and their emission sources

Greenhouse gases (GHGs)	Global warming potention (GWP)	Common emission sources
Carbon dioxide	1	Combustion of fossil fuels
Methane	21	Animal, agriculture, and municipal wastes; rice cultivation
N_2O	310	Combustion, processes, chemical industry
HFCs	140–11 700	Refrigerants
PFCs	6 500–9 200	Semiconductor industry
SF6	23 900	Electrical insulation

Carbon markets and other carbon-related financing mechanisms are increasingly being considered as potential sources of funding for sustainable development projects. Carbon markets have been created both voluntarily and through regulation to give value to CO_2 equivalent (CO_2e, or carbon for short) as a tradable commodity. In the more developed markets, buyers purchase certificates from sellers verifying defined reductions in CO_2e from specific projects. From a development and environmental perspective, the rationale for the market is that it provides a means through which the externality of emissions can be internalised within markets. Carbon markets offer a more economical method of reducing carbon emissions than, for example, investing in new plant and equipment. Typically, the cost of reducing one tonne of CO_2e in industrialised nations is US$15–100. However, the cost of achieving a similar reduction in developing economies is often much less (US$1–4 per tonne), thus offering an incentive for transferring resources to the developing world to offset greenhouse gas emissions in the developed world.

Global carbon finance

There are broadly two types of carbon market. First, the compliance-driven market, which was created by compliance requirements emerging from the Kyoto protocol under which industrialised country signatories have pledged to reduce their emissions by 5.2 per cent in the 2008–12 period relative to a 1990 baseline. Most carbon trade takes place in the EU Emission Trading Scheme (ETS) and the Clean Development Mechanism (CDM). Second, but relatively small, are voluntary markets under which buyers and sellers exchange, on an offset basis but outside the provisions and regulations of official agreements. Much of this is dominated by forestry projects.

Most emission trading is done within the ETS, by far the biggest market. CDM transactions, providing the main mechanism for developing countries, are dominated by China (in the CDM, 84 per cent of offset project transactions in 2008 were for projects located in China, with 4 per cent in India and 4 per cent in the rest of Asia (Capoor and Ambrosi, 2009[4])). Growth has come primarily from utilities or experienced operators using trusted and known technologies (e.g. industrial gases and large scale hydro and wind projects). In other words, as in any market, initial growth has come

[4] K. Capoor and P. Ambrosi: *State and trends of the carbon market 2009* (Washington, DC, World Bank, 2009).

from the safest and most established players. The market has currently not advanced substantially to more difficult (and poorer) countries, smaller players and more innovative carbon-reducing technologies related to renewable energy and energy efficiency.

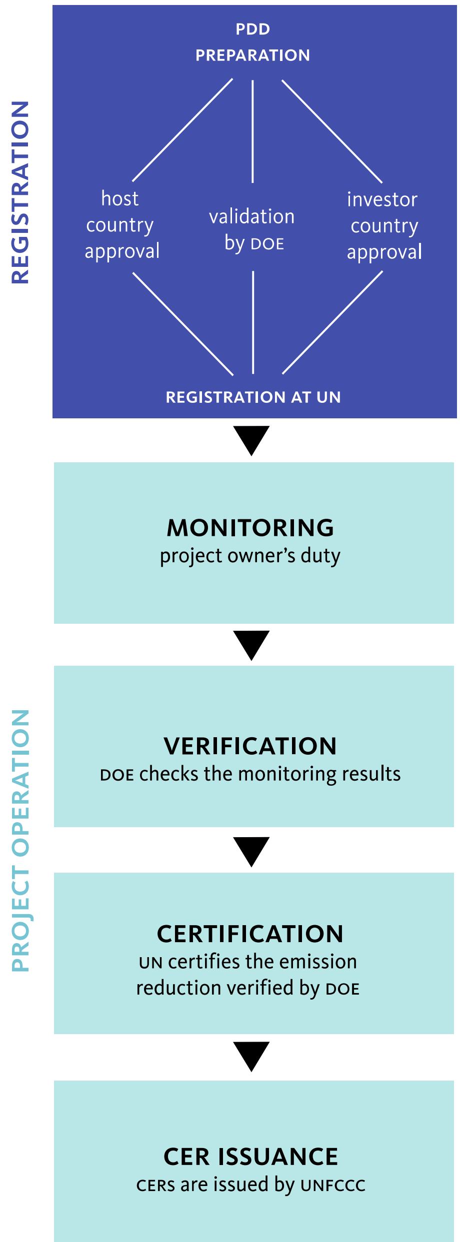
Accessing funding under the CDM

Assuming a potential project has been identified, the principal steps required to access CDM financing are as follows:

Step 1: Estimate GHG emission benefits

The project should have details on the GHG emission calculation and methods of monitoring it over a stipulated period of time. The quantification process includes:

- Definition of the boundaries of the project — i.e. list of project activities that involve intake or release of greenhouse gases.
- Description of the baseline and additionality — baseline scenario represents what would happen in the absence of the project. Additionality is the extent to which the activities promoted by the project (e.g. the planting of trees) can only have happened with the project's specific intervention.
- Quantification of baseline emissions and crediting period — the emissions that would occur with the baseline scenario, and the number of years over which the project may take credit, will be defined using one of the procedures approved by the CDM Executive Board.
- The emissions and uptake of carbon by the project — the net benefit of the project is then calculated by subtracting the emissions that would have occurred in the baseline scenario.
- Adjustment for leakage and risk — the amount of benefit for which a project will be allowed to take credit may need to be adjusted to take account of leakage and risks.



PDD: PROJECT DESIGN DOCUMENT
A project proposal using the special UN standard
DOE: DESIGNATED OPERATIONAL ENTITY
A third entity accredited to confduct validation and verification by the UN

Step 2: Develop a PDD (Project Design Document)

The results and methodologies used in the quantification of the greenhouse gas benefits will need to be presented in a Project Design Document. A report summarising comments by local stakeholders and how these are taken into account in the project design must also be included in this document.

Step 3: Host country approval

Any project wishing to participate in the CDM must obtain approval from the host government. The relevant government National Authority for CDM is tasked with facilitating this. In addition, the host government should determine whether or not the project will lead to sustainable development benefits.

Step 4: Validation of the project

Before projects can produce emission reductions that will be recognised by the CDM, they must be "validated" by one of the independent companies approved by the CDM Executive Board. The project developer must submit the Project Design Document and any related documentation to the so-called "operational entity". The process will involve detailed scrutiny of the institutional capacity of the project stakeholders, the evidence underlying the calculations of carbon benefits, the systems to be used for monitoring, and of course the relevant government approvals. During this period, the Project Design Document will be made publicly available for comments.

Step 5: Registration with the CDM

The validation report and Project Design Document will be submitted to the CDM Executive Board by the operational entity. Registration will be finalised after a maximum of eight weeks from receipt, unless a review is requested.

Step 6: Project implementation and monitoring

Registered projects, and those that have entered the implementation phase, will be required to maintain internal monitoring systems to demonstrate they are achieving the emission reductions specified in the Project Design Document.

Step 7: Verification and certification

Once the project is being implemented, it will undergo additional scrutiny by the operational entities in the form of verification and certification. The verification report is then made available to the CDM Executive Board and the general public, after which the Certified Emission Reductions will be issued to the project developer within 15 days (unless the Executive Board requests a review).

Issues and challenges

As has been alluded to above, there is a number of challenges to accessing climate-finance for green jobs value chain promotion. These include:

- High transaction costs of engaging in the market — the process through which projects can qualify to sell carbon is complicated, lengthy and expensive. As outlined, it involves application to national authorities in accordance with a standard format, external inspection of proposals by accredited parties (designated operational entities, DOEs) and external monitoring. The pipeline through which projects must pass takes one to two years. Delays tend to favour larger projects with robust finances.
- Capacity constraints — becoming a DOE costs approximately €150,000 and is an 18-month process. There are few DOEs — they are a substantial bottleneck with projects reporting that it takes six months to engage them. On the project development side, there are limitations in the expertise available to structure and assess new projects.
- Market credibility — in the voluntary market there is a growing (and confusing) number of independently established standards. The resulting confusion over how carbon savings should be calculated tends to undermine the credibility of the market's 'currency' and therefore the market itself. Disputes over the additionality of some projects within the CDM have further served to undermine confidence in regulatory mechanisms and the market as a whole.
- An uncertain future — provisions under the Kyoto agreement last until 2012 but the nature of the regulatory framework beyond this is unclear. Reforms to the CDM were mandated as a result of the Copenhagen summit; however the lack of clarity on a replacement for the Kyoto Protocol continues to inhibit market development.

Value chain development for green jobs in Asia – Volume II: Operational guide

This guide provides further practical tools and guidance to assist in the implementation of green jobs value chain development initiatives. These are intended to outline the key steps specific to the green jobs value chain development approach, and should be used in conjunction with internal project management systems and processes, and other external value chain development methodologies and tools. The aim is to promote employment that is environmentally, socially and economically sustainable, and is particularly focused on the challenges and opportunities for green jobs promotion in the Asia-Pacific region.

Central to the green jobs intervention design process is the identification and promotion of co-benefits; interventions that promote positive outcomes in more than one of the green jobs focus areas (e.g. global environmental impacts, local environmental impacts, decent work and sustainable livelihoods). The methodology emphasises the importance of engaging with the underlying structural factors and advocates the use of a systems-based approach which involves engagement not only with enterprises but also with government bodies and worker's organizations. Reducing the environmental and social externalities generated by the value chain therefore requires not just a firm-level cost or competitiveness analysis, but also an engagement with the wider business enabling environment.

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