



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

GLOBAL VALUE CHAINS AND DEVELOPMENT

UNIDO's Support towards Inclusive and
Sustainable Industrial Development



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Foreword



Global value chains (GVCs) are increasingly playing a leading role in production and trade for international markets. Today, more than a half of manufactured products in trade are intermediate goods for further processing in other countries. The values of imported goods in exports are also on the rise. Many manufacturing and service firms without direct involvement in international trade are indirectly participating in GVCs as suppliers to firms in GVCs. As a window of opportunity to access international markets, to absorb new technologies and to follow

international standards of production, GVCs have tremendous implications for UNIDO's vision of inclusive and sustainable industrial development.

This report documents UNIDO's extensive experience in the field of GVCs and presents UNIDO's approaches in research, diagnostic tool development and technical cooperation projects to move towards inclusive and sustainable industrial development through GVCs. Given the increasing weight of GVCs in world production and trade, a systematic review of our work on GVCs comes at a timely moment and documents UNIDO's far-reaching support for the industrialization of developing countries.

Our strength derives from three interrelated factors. First, UNIDO takes an inclusive approach towards value chain development, collaborating with different stakeholders, promoting linkages and supporting relevant organizations in GVCs based on our experience that technical support without in-depth understanding of the situation on the ground yields little impact. Second, UNIDO is involved in all the functions of research and policy advice, diagnostic tool development and technical cooperation projects to create synergies among them for higher impact. Finally, given the issues and challenges that need to be addressed in relation to GVCs, such as trade facilitation, technological upgrading and sustainable production, UNIDO works closely with other international organizations, research institutes, national development agencies as well as country governments and stakeholders.

This report addresses the challenges and obstacles faced by countries seeking to establish effective GVCs to promote inclusive and sustainable industrial development in accordance with Goal 9 of the 2030 Agenda for Sustainable Development. It presents approaches and possible solutions that UNIDO has developed to overcome these challenges, and helps countries achieve their development goals.

I sincerely hope that our Member States and institutional partners will be inspired by this report to engage in a dialogue with us to join forces and discuss where, what and how we can work together to realize our common objectives.

A handwritten signature in blue ink, consisting of stylized Chinese characters, positioned above the printed name of the Director General.

LI Yong

Director General of UNIDO

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The project was initiated by Shichun Wang and Zhen Wang in consultation with Member States. The report was produced by Nobuya Haraguchi, Frank Hartwich and Alejandro Lavopa, drawing from an extensive review of UNIDO materials. The review was carried out by Andreas Birnstingl.

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List of Abbreviations

3ADI	Accelerated Agribusiness and Agro-industries Development Initiative	GI	Geographical Identification
3C	Compete, Conform and Connect	GIZ	Gesellschaft für Internationale Zusammenarbeit
ACET	African Centre for Economic Transformation	GMP	Good Manufacturing Practices
ACMA	Automotive Component Manufacturers Association of India	GNP	Gross National Product
AfDB	African Development Bank	GPS	Global Positioning Technologies
AfriPANet	Africa Investment Promotion Agency Network	GVC	Global Value Chain
AIDC	Automotive Industry Development Centre	HACCP	Hazard Analysis Critical Control Point
ASEAN	Association of South-East Asian Nations	HS	Harmonized Commodity Description and Coding System
BOP	Balance of Payments	ICT	International Conference on Trade
BRICS	Brazil, Russia, India, China and South Africa	IDE-JETRO	Institute of Developing Economies – Japan External Trade Organization
CAS	Complex Adaptive Systems	IDI	Import Dependency Index
CEC	Commission for Environmental Cooperation	IDR	Industrial Development Report
CFC	Common Fund for Commodities	IFAD	International Fund for Agricultural Development
COD	Chemical Oxygen Demand	IFW	Institut für Weltwirtschaft
COMFAR	Computer Model for Feasibility Analysis and Reporting	IKB	Industrial Knowledge Bank
COPS	Codes of Practices	ILO	International Labour Organization
COTANCE	European Confederation of the Leather Industry	IMD	International Institute for Management Development
CSR	Corporate Social Responsibility	IMF	International Monetary Fund
DCED	Donor Committee on Enterprise Development	IMP	Investment Monitoring Platform
DMC	Domestic Material Consumption	IPA	Investment Promotion Agency
EC	European Commission	IRR	Internal Rate of Return
ECI	Export Competitiveness Index	ISID	Inclusive and Sustainable Industrial Development
EU	European Union	ISO	International Organization for Standardization
FAO	Food and Agriculture Organization	IT	Information Technology
FDI	Foreign Direct Investment	ITC	International Trade Centre
FSC	Forestry Sustainability Council	ITPO	Investment and Technology Promotion Office
GDP	Gross Domestic Product	IULTCS	International Union of Leather Technologists and Chemists

LCA	Life Cycle Assessment	STDF	Standards and Trade Development Facility
MEFA	Material and Energy Flow Analysis	TBT	Technical Barriers to Trade
MF	Material Footprint	TRTA	Trade Related Technical Assistance
MIS	Management Information Service	UAE	United Arab Emirates
MNE	Multi-National Enterprise	UIBE	University of International Business and Economics
MRIO	Multi-Regional Input-Output	UITIC	International Union of Shoe Industry Technicians
N4P	Networks for Prosperity	UNCOMTRADE	United Nations Commodity Trade Statistics Database
NAFTA	North American Free Trade Agreement	UNCTAD	United Nations Conference on Trade and Development
NGO	Non-Governmental Organization	UNDESA	United Nations Department of Economy and Social Affairs
NIC	Newly Industrialized Country	UNDP	United Nations Development Programme
NPV	Net Present Value	UNEP	United Nations Environment Programme
NQS	National Quality System	UNIDO	United Nations Industrial Development Organization
NRIS	Near Infrared Reflectance Spectroscopy	UNSD	United Nations Statistics Division
OECD	Organisation for Economic Co-operation and Development	USAID	United States Agency for International Development
OEM	Original Equipment Manufacturer	USSR	Union of Soviet Socialist Republics
OSH	Occupational Safety and Health	UTEPI	Unidad Técnica de Estudios para la Industria / Technical Unit for Industrial Studies
PAMPAT	Projet d'accès aux marchés des produits agroalimentaires et de terroir	VCCI	Viet Nam Chamber of Commerce and Industry
R&D	Research and Development	VIMP	Viet Nam Investment Monitoring and management Platform
RECP	Resource Efficiency and Cleaner Production	WAP	Wireless Application Protocol
RFQ	Requests For Quotations	WEF	World Economic Forum
ROI	Return on Investment	WFP	World Food Programme
RSP	Retail Selling Price	WIOD	World Input Output Database
SDG	Sustainable Development Goals	WTO	World Trade Organization
SECO	State Secretariat for Economic Affairs		
SME	Small and Medium Enterprise		
SNA	Social Network Analysis		
SPS	Sanitary and Phyto-Sanitary measures		
SPX	Subcontracting and Partnership Exchange		
SSA	Sub-Saharan Africa		

1. INTRODUCTION

For over three decades, governments and development agencies have been promoting value chain development as a key element of productive development strategies. Value chain promotion fosters the development of firms within and around the value chain. The rationale is that businesses do not become successful on their own, but depend on suppliers and service providers as well as on buyers and markets. They also depend on investment and access to knowledge that can come from skills providers, research and advisory services and networks of learning involving similar businesses and others. The value chain approach provides a convenient framework to better understand the context in which businesses evolve and to design policies, programmes and projects to improve them and the contexts in which they operate in. Value chain development can thus be understood as a development approach.

Value chains have become susceptible to the unrelenting trends in globalization, i.e. the production process has become more fragmented, it is distributed across borders in accordance with factors of competitiveness and dominated by transnational companies and global players. Global production networks or global value chains (GVCs) constitute important opportunities for developing countries to become part of the global economy, to absorb knowledge and technology and add value to their products. However, they may also cause the potential exclusion of developing country firms that lack the necessary financial means as well as support from global players and local governments. As a consequence of this exclusion, developing countries could remain providers of low-value primary materials, missing out on industrialization and value added which is usually an intermediary step towards a modern, diversified and prosperous economy. Moreover, even when developing countries manage to insert themselves in GVCs, they might still face the risk of remaining in low value added positions within the chain, with limited learning and upgrading opportunities. In that case, insertion in GVCs does not necessarily support structural transformation. Developing countries should look for ways to enter into GVCs in a gainful way.

Ultimately, the gains from participation in GVCs depend on factors of competitiveness, market power and distribution of value captured. Governments are, however, well advised to look beyond GVC participation and its immediate returns and should also factor in broader public policy objectives, such as the number and quality of jobs created, spill-over effects into other sectors, the non-economic and environmental impact of industrial activities, and more generally, contributions to economic diversification and resilience. In this scenario, value chain promotion entails a new set of measures, focusing specifically on inclusion and value capture when improving the position of domestic production in global value chains. Many of these measures are geared towards supporting developing countries participating in GVCs.

Among others, the value chain approach has been used in the field of industrial development which, in a nutshell, is a process of structural transformation (Lin, 2011; UNIDO, 2013e). Industrial development involves the diversification of domestic production as well as shifting productive factors from traditional agriculture to modern agriculture, industry and services (Rodrik, 2007). Industrial development can be influenced by industrial policy interventions that steer investment towards and improve production activities in industries that are beneficial

to an economy and specific parts of society in the long term (Hartwich and Pataconi, 2015). Another type of industrial policy relates to horizontal, broad-based policy measures that seek to improve infrastructure, energy supply, business regulations and connectivity. While this type of policy is more universally accepted by mainstream economists and policymakers, it may not be sufficient on its own to foster industrial development.

The latest efforts in industrial development aim at making industrial production more sustainable, economic, social and environmentally friendly and inclusive, i.e. enabling the participation of a potentially large, often poorer group of society. The Lima Declaration, adopted by UNIDO's Member States in 2013, set the foundation for a new approach of Inclusive and Sustainable Industrial Development (ISID), development that focuses on both the participation of many and of the poor in the production of goods and services, as well as on positive effects on the environment. The inclusive and sustainable industrial development agenda is closely linked to the recently issued Sustainable Development Goals (SDG), which are to pave the world's development path towards wellbeing, prosperity and sustainability in the decades to come. SDG 9, in particular, namely to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, as well as many other SDGs now focus on drivers of change such as economic growth, job creation, reduced inequality and innovation that makes better and more careful use of natural resources. Industry plays a leading role in advancing all of these drivers.

In view of the opportunities value chain development offer to developing countries and despite the many risks and caveats, governments and development agencies design and implement various policies and programmes for value chain inclusion. Some of these focus on market development, some on improving organization and productivity, while others focus on linkages, foreign investment, technology transfer and skills development. Though all of these policies and programmes may be opportune in specific situations, no overall framework to link them together for effective industrial development and the inclusion of developing countries in GVCs has been developed as of yet. Among the initiatives towards this end are the Value Chain Group of the Donor Committee on Enterprise Development and the Inter-Agency Group on Value Chain Development, with UN organizations, including ICT, ILO, FAO, UNCTAD, UNDP, UNIDO and WFP, that have undertaken initial steps to develop a common understanding of the goals of and entry points for intervention in value chain development for developing countries.

This report aims to increase the current understanding of dynamically developing global value chains and link them to effects on sustainable and inclusive industrial development. It addresses two key questions: a) how do global value chains influence industrial development in less developed countries? and b) what strategies can countries adopt to integrate into global value chains, thereby triggering inclusive and sustainable industrial development? The report draws from three interrelated areas of value chain-based work that has been carried out by UNIDO: research on developing countries' involvement in value chains; tools and manuals guiding developing countries' strategies and programmes for industrial value chain development; and concrete, project-based technical cooperation interventions and the lessons that can be gleaned from them.

The report is structured as follows. In Chapter 2, the main conceptual insights into value chain development derived from the major schools of thought are discussed and linked to industrial

development in developing countries. Chapter 3 reviews empirical evidence on the effects of global value chain organization on industrial development, drawing in particular from the rich and diverse body of UNIDO research. Chapter 4 presents UNIDO's approach to value chain analysis, which can be used to design and implement successful value chain development support programmes, and which may eventually lead to higher degrees of inclusiveness and sustainability. Chapter 5 focuses on UNIDO's experiences with implementing value chain-centred development interventions that can be geared towards inclusive and sustainable industrial development. Chapter 6 summarizes the report's findings and discusses the implications of GVCs for ISID and SDGs and the way forward for UNIDO.

2. VALUE CHAINS, GLOBALIZATION AND INDUSTRIAL DEVELOPMENT

The concept of value chains has been explored in theory and practice for more than three decades, although its roots can be traced further back. Summarizing the many facets of the debate on value chains and how value chain-based development can be achieved would go beyond the scope of this report. Hence, following a brief overview of the concept, the focus in this section will be on how global value chains influence industrial development, particularly in less developed countries.

2.1. Conceptual foundations and caveats

There is no widespread consensus on value chains as such. A consensus might not, however, even be necessary, since the concept of value chains is actually used for a number of diverse purposes. Typically, value chains are understood as the result of (efficient) economic and social organization. Within this context, there are four main entry points into the definition of value chains:

- **Value chains as sets of value adding activities:** Kaplinsky and Morris (2001:4), for example, define a value chain as a “*set of activities which are required to bring a product or service from conception, through the different phases of production, delivery to final consumers, and final disposal after use.*” Similarly, the MIT Industrial Performance Centre defines a value chain in the more narrow sense as “*a value-adding sequence of business functions such as research, design, production, marketing, transportation, logistics, distribution, after-sales service, and recycling.*”¹ To depict the various steps or segments of production, the notion of “tiers” is typically used².
- **Value chains as arrays of linkages:** Webber and Labaste (2010), for example, consider value chains to be mutually beneficial linkages among firms that enable the firms to take advantage of market opportunities. UNIDO (2009b:i), primarily working with value chains that generate a significant amount of value in the processing and transformation segments, defines value chains as “*mechanisms that allow producers, processors, buyers, sellers, and consumers — separated by time and space — to gradually add value to products and services as they pass from one link in the chain to the next.*”
- **Value chains as networks or systems:** Already in the early 1990s, Gereffi and Korzeniewicz (1994) described value chains as global production and sourcing networks. In line with this notion, Jeannot (2006:23) describes the value chain as a system “*which includes all industry*

¹ <https://ipc.mit.edu/research/globalization/global-value-chains>

² A Tier 1 company is the most important member of a supply chain, supplying components directly to the original equipment manufacturer (OEM) that set up the chain. Creating a tiered supply chain is part of supply chain management. According to the Council of Supply Chain Management Professionals, its aim is to link important business functions and processes in the supply chain into an integrated business model. In a typical supply chain, Tier 2 companies supply companies in Tier 1; Tier 3 companies supply Tier 2 companies, and so on. Tiered supply chains are common in industries such as aerospace or automotive manufacturing, where the final product consists of many complex components and sub-assemblies that must comply with stringent quality, manufacturing and business standards.

participants, connected in a successive chain of added value, from raw material production to wholesalers, retailers and customers and in some cases recycling.” The related concepts of global production systems (Sturgeon, 2013), global production networks (UNIDO, 2004) or market systems (Dunn, 2012) also contend that work division and interrelationships between businesses in a value chain are more of a systemic nature.

- **Value chains as cycles:** This notion is mainly related to the idea that value chains operate in the natural environment on which they depend and which, in turn, they influence. The Green Growth Working Group of the Donor Committee on Enterprise Development (DCED, 2012), for example, considers green value chain development to be a “*systemic approach, integrating environmental support functions, environmental rules and regulations and market players in greening the value chain transforming the conventional linear view of value chains into a cyclical system view.*” Similarly, UNIDO (2013c) argues that an industry’s greening potential is best identified in the context of a value chain defined by the flow of products from primary production to consumption, focusing in particular on resource use, waste management and recycling.

Regardless of which definition is applied, a general distinction can be made between positive and normative approaches to value chains. The concept of value chains may provide a convenient heuristic means to help understand how they operate. This includes descriptive presentations of how production steps are fragmented and distributed among geographical locations as well as more analytical perspectives including governance structures of trade, the different degrees of power of the relevant actors and how these elements are influenced by institutional and policy contexts. The analytical positive perspective typically focuses on four dimensions: i) input-output structure; ii) geographical distribution; iii) role of lead firms or powerful intermediaries, suppliers, traders, etc.; and iv) institutional context at the international, regional and national or local level.

One major aspect of the positive approach is that value chains *exist*—whether well-developed and well-organized or not—and it is up to positive research and analysis to determine how they function.

The normative approach, on the other hand, focuses on what needs to change in order to improve the performance of the value chain. Value chain performance is subject to policy priorities that can be linked to a diverse set of development goals, such as economic development, income and employment generation, poverty alleviation or environmental sustainability (see Box 2.1).

Box 2.1: Value chain development goals

Value chain development goals can be numerous and diverse and cut across human, social, economic and environmental development goals, including:

- **Economic development:** Maintain and increase countries' and sectors' production of goods and services.
- **Poverty reduction:** Increase the income of the poor in society.
- **Industrial development in developing countries:** Assisting private sector companies in developing countries to become engaged in industrial production, diversification of the economy and regional development.
- **Import substitution:** Engagement in the production of goods and services a country imports to reduce expenditures in foreign exchange and to promote increased economic output.
- **Export promotion:** Engagement in the production of goods and services a country can export to increase foreign exchange earnings and overall economic output.
- **Regional development:** Promotion of economic growth in certain regions and/or industries of the economy.
- **Enterprise development:** Development of productive firms, especially small-to-medium-sized enterprises (SMEs) and their involvement/inclusion in local and global value chains.
- **Value capture:** Ensuring insertion/participation and increasing the amount of value added of certain actors in the value chain.
- **Income generation:** Improvement in the incomes of actors engaged in the various segments of the value chain.
- **Employment:** Economic development, which results in guaranteeing and extending the employment of a significant number of workers and employees.
- **Developing opportunities to create decent jobs:** Focusing on improved working conditions and pay for workers in certain sectors.
- **Environmental sustainability:** Improving environmental performance in terms of resource use and energy consumption.

This general picture is further complicated when we consider the congruence (or lack thereof) of different goals. When aiming to achieve a given goal (e.g. rural income), another goal may simultaneously be realized (e.g. rural employment), while the effects may be adverse on a third goal being pursued (e.g. environmental sustainability). To deal with this dilemma, value chain developers should be aware of the systemic nature of value chain development and monitor and control—at least to the extent possible—the effects of their activities on other goals.

The normative approach to value chain development can be combined with a positive analysis of the status quo of the value chain. In fact, UNIDO (2011) makes the case that coherent interventions in value chain development can only be designed on the basis of solid positive analyses. A comprehensive value chain analysis, according to UNIDO, thus has to include a given set of analytical dimensions (see Chapter 4), focusing on all (not parts of) value chain segments and a set of issues that cut across the value chain, including governance and finance.

A distinction must be made between the general goals of value chain development and measures of value chain improvement, i.e. the means used to attain these goals. For example, a value chain development programme may aim to increase the income of smallholder vegetable producers. Improving coordination between producers and buyers that run packing houses would be one of the measures to attain this particular goal in value chain development.

Another crucial issue that must be mentioned here relates to the boundaries of value chains. A value chain may, for example, be limited to the domestic market. However, cross-border trade usually takes place and nearly all value chains are therefore global in character, alone given that some of their inputs are sourced from abroad. The boundaries are often set by the commodity upon which the value chain is built (e.g. the coffee or the copper value chain). Such commodity value chains usually end with sub-products directly derived from the commodity up to certain cut-off points determined by a specific degree of transformation (e.g. roasted coffee or a copper cable). Another option is to look at value chains in terms of manufacturing and transformation in which different products come together to create a final product (e.g. the furniture or the fruit processing value chain). Other value chains include a full array of processes and firms engaged in supplying different intermediary and by-products to produce a final product that is ready for consumption (e.g. the automotive value chain or the IT value chain). Boundary setting is also difficult when considering service providers in knowledge, logistics, finance and the wider business environment, including public agencies, infrastructure providers, etc., which can all be subsumed under the value chain but also form part of other value chains and systems.

Given the difficulties that arise when attempting to set the boundaries of a value chain, this report relies on a flexible perspective that looks at value chains as open systems characterized by numerous interactions with other parts of the global economy. The analysis can thus focus on those parts for which data are available and the interventions should be based on feasibility. Defining the goals of value chain development further helps determine the extent of value chain intervention and its boundaries.

Discussions on value chain development may also get caught up in the issue of which value chain to choose. Some practitioners attach much importance to choice of value chain, arguing that the value chain's actual impact can only be achieved if there is sufficient potential in marketing, upgrading, competitiveness or poverty alleviation, for example. Others argue that all value chains have development potential as long as proper analysis is carried out and creativity is applied in solution finding. Ultimately, the development potential of a value chain development support programme depends on a) the choice of value chain, and b) the design and implementation of value chain development measures. However, a) would never have an impact without b).

2.2. Diverse approaches to industrial value chain development

Different strands of thinking and approaches have contributed to the field of “value chain development” and a large body of literature is available describing these approaches (see, for example, Kaplinsky and Morris, 2001; UNIDO, 2009b; Altenburg, 2007). We will not repeat this

exercise here but rather discuss a subset of value chain approaches that focus specifically on value chain development in the context of industrial development. Five broad approaches can be distinguished in this regard:

- **Management of industrial firms:** The seminal works of Porter (1985, 1990) provide two important foundations for the value chain concept. First, he distinguishes between various stages in the production process, including inbound logistics for supplies, firm operations, outbound logistics, marketing and sales as well as support services. This distinction has clearly been developed from the perspective of an individual firm engaged in the production of goods or services looking at its backward (supply) and forward (sales) linkages in the chain of production. Second, Porter (1990) explores the way value is created in a system of multiple linkages (the “value system”). Based on these two aspects, Porter laid the foundation of a theory to explain why certain firms perform beyond the factor costs differential suggested by neoclassical economics. In his view, firm performance is subject to how a firm manages its supply relationship, how it is embedded in the overall structure of the value chain (value chain integration) and how well the value chain is organized and is able to maintain chain-wide competitiveness. Hence, industrial structure and organization, among other factors, determine the firm and sector wide development. However, Porter did not provide any guidelines for the development of value chains or how to better integrate and competitively structure the industrial sector. Instead, he focused on how firms can achieve “competitive advantages” vis-à-vis producers from other countries under conditions of supply limitations, strong rivalry and specific consumer demands.
- **Industrial clusters:** Industrial clusters are geographic concentrations of interconnected firms that produce goods or services in similar ways and of similar kind. Within a cluster, firms may benefit from the use of common knowledge and technology, joint learning as well as joint access to supplier, buyer and service infrastructure. The cluster analytical approach focuses on the interactions between geographically concentrated firms (horizontal linkages) and their relationships with firms and organizations in other segments of the value chain (vertical linkages). The assumption is that synergies or systemic competitiveness can be achieved through spatial organization, strategic firm alliances and networking. Cluster development often entails supporting clusters of firms to improve their business and get connected to suppliers and buyers and to develop systemic competence based on information exchange, joint learning and innovation similar to those interventions in value chain development. USAID (2008), for example, argues that a cluster approach can be a valuable mechanism to address value chain constraints, especially those requiring the transformation of stakeholder relationships. Similarly, UNIDO (2013f) argues that the cluster development approach is effective in fostering cooperative efforts and the networking of firms to mobilize and spread knowledge and ideas as well as information and technology within firms in the cluster. However, it is important to bear in mind that not all value chains are necessarily characterized by an agglomeration of firms of similar type at a common geographic location; in that case, interventions cannot build on collective action among horizontally structured firms.
- **Governance, upgrading and global value chains:** Based on empirical studies in the garments, footwear and automobiles industries, Gereffi et al. coined the notion of GVCs (Gereffi et al., 2001). Their work marked a shift from firm-level analysis to the organizational network of firms and supporting institutions within the value chain. The focus lies on the governance

structures of value chains and the conditions for suppliers to participate and upgrade their industries as value chains become subject to increasing openness in trade and foreign direct investment. In this context, upgrading refers to the improvement of a firm's productivity and competitiveness through the creation of technological and managerial capacity to ensure its inclusion in GVCs. Value chain upgrading means acquiring knowledge and technologies, but at a faster pace than competitors. Methods of upgrading include product upgrading, process upgrading, functional upgrading and inter-sectoral upgrading. One major argument often made in the GVC discussion is that certain global players have the power to impose contract conditions. Suppliers whose products are easier to produce or who are replaceable by lead buyers (buyer-driven value chain governance) and producers who are dependent on suppliers of advanced and sophisticated inputs and technology that cannot be easily sourced elsewhere (producer-driven value chain governance) are usually at the receiving end of imposed contract conditions. Hence, lead players maintain a higher share in value addition due to their ownership of well-established brand names, proprietary technology or access to exclusive information on different input and product markets. Within the GVC literature, the focus is often on asymmetric power relationships and the limitations of developing country producers to become suppliers. The GVC literature has provided important foundations for inclusive industrial development.

- **Statistical approaches:** A considerable contribution to the area of value chain development has been provided in the field of statistics and measurement. International organizations such as the OECD, UNCTAD, UNIDO, UNSD and WTO analyse international trade data and how these figures actually reflect the value created by firms and countries at the local level. The increasing trade of intermediary goods—often less well accounted for—as well as double counting of trade flows distorted the picture of bilateral trade balances. In response, UNCTAD launched a global value chain dataset in an attempt to map the distribution of value added in global trade across a broad range of industries and countries (UNCTAD, 2013). In a similar vein, the OECD together with the WTO jointly established a detailed database on the trade of value added products³. Likewise, using international input-output databases⁴, UNIDO analyses production linkages between manufacturing and manufacturing-related service industries and the impact of manufacturing production on service employment (UNIDO, 2013e). UNIDO's Industrial Development Report 2016 discusses global production linkages based on the value flow of intermediate goods (UNIDO, 2015b). The WTO prepared a report in collaboration with UNCTAD and the OECD for the G-20 Summit in 2013, contending that GVCs have become a dominant feature of world trade and investment, which offer new prospects for growth, development and jobs (OECD, WTO and UNCTAD, 2013).
- **Innovation systems:** Based on the seminal works of Freeman (1987) and Nelson and Winter (1982), this approach suggests that the competitiveness of national industries is based on the structure and performance of national innovation systems. One prominent example is Japan's automotive and IT industries (Freeman, 1987). Albeit not directly related to the value chain discussion, the innovation systems approach implies that access to knowledge and technology and thus to systemic competitiveness depends on firms' access to innovations and consequently on the embeddedness of actors in the value chains that entail technological

3 The 2015 edition of this dataset covers 61 economies and 34 industrial sectors between 1995 and 2011. For further details, see www.oecd.org/trade/valueadded

4 Two important initiatives in this regard are the World Input-Output Database (WIOD) and the Eora Multi-Region Input-Output (MRIO) Database. See Timmer et al., 2015 and Lenzen et al., 2013 for the corresponding details.

upgrading, research and development (R&D) and learning. The development focus of this approach is typically on building individual and collective competences among value chain actors, networks of knowledge exchange, joint learning and technology development as well as the institutional and policy frameworks that create an enabling environment for chain actors to develop and use innovations. For actors from developing countries to be included in GVCs, the approach suggests that innovations must meet the absorptive capabilities of its users and that innovation capacities can only be built gradually within a network of joint learning and adaptation involving users, peers and other value chain actors. Technological latecomers can benefit from investments by previous innovators and copy, adapt and improve the innovations for their own purposes. Later theoretical works refer to innovation systems as Complex Adaptive Systems (CAS), where the innovations being used are emergent properties resulting from system immanent diversity and processes of selection and self-organization of the actors in the system (World Bank, 2012). This is consistent with earlier works of Choi et al. (2001) who—from the angle of operations research—propose that supply networks emerge from network dynamics rather than from purposeful design by a singular entity.

2.3. Globalization and the inclusion of developing countries

The literature on value chains in a global context has been instrumental for understanding how relationships in a value chain are coordinated across firms and countries, what the rules of the game are, who takes the relevant decisions and what the implications are for the distribution of value added and the inclusion or exclusion of suppliers and trading partners from developing countries. The literature has also been critical in highlighting issues such as buyer power, barriers of entry and limits to inclusion of developing countries. There is an underlying notion that the “rules of the game” are not “fair” and detrimental for developing countries. The GVC approach thus also provides justification for intervention in value chain development (value chain promotion) in developing countries based on the idea that producers from developing countries will otherwise become too vulnerable vis-à-vis global players and capture too little value in GVCs (Pietrobelli and Staritz, 2013; Staritz, 2012).

Globalization as a process of global integration of production is characterized by an increasing trade of commodities as well as of intermediary and end products, benefiting from the proliferation of ever-more intelligent communication technology, market liberalization and rapidly evolving (and at times converging) consumption patterns. In this context, the influence of global value chains is increasing. Trade in intermediate goods—a widely used indicator of participation in global value chains—accounted for half of global trade in 2011, reflecting an increase from around US\$ 152 billion to US\$ 6,922 billion between 1970 and 2011, or by a nearly 10 per cent increase annually (UNIDO, 2013, adapted from IDE-JETRO and WTO, 2011 and UN-COMTRADE). Similarly, a joint report by the OECD, WTO and World Bank asserts that countries are increasingly relying on foreign inputs for their own firms’ exports, which may then be further processed in partner countries. The report suggests that between 30 per cent and 60 per cent of exports from G-20 countries consist of intermediate inputs traded within GVCs. Comparing 2009 and 1995, it indicates increases in nearly all G-20 economies, particularly in China, India, Japan and the Republic of Korea (OECD, WTO and World Bank, 2014).

In view of the growing integration of the global economy, GVCs offer an opportunity that has not yet been fully realized, namely for developing countries to integrate in the world economy and foster their economic and industrial growth. With some exceptions in South-East Asia, most developing country producers tend to be part of labour-intensive, buyer-driven chains. According to the OECD-WTO database on Trade in Value Added (May 2013), 67 per cent of total global value created in global value chains accrue to OECD countries, while the share of NICs and BRICS countries is 25 per cent. Only 8 per cent of total value added is attributed to all other developing countries and LDCs. As traditional isolated production systems struggle to develop links with local and global markets, small-scale producers and processors in LDCs are missing out on opportunities to produce and market their products. Emerging markets are currently playing a more significant and diverse role in GVCs (Gereffi and Sturgeon, 2013) as a major shift of world manufacturing activities from North America and Europe to developing regions has taken place. East and Southeast Asia now account for one-third of world manufacturing value added. UNCTAD (2013) and the African Economic Outlook (2014) find that GVCs are heavily concentrated in the regional blocs of East Asia, Europe and North America, and that Africa captures a small but growing share of trade in GVCs. Africa's participation primarily remains in upstream production of low value commodities.

While GVCs might increase the vulnerability of producers in developing countries to interventions from global players and competition from abroad, there are few alternatives to accepting their existence and proliferation. Hence, developing countries are left with little choice but to develop strategies to make the best of reality. As Altenburg (2007) puts it, the real question for developing countries is not *if* but *how* to join GVCs. Indeed, GVCs have become key elements in the formation of development strategies and programmes of governments and multinational development organizations which are well advised to take a balanced approach focussing on competitiveness, inclusiveness as well as sustainability. In cases where only few players from developing countries reap benefits and where effects on the environment are detrimental, developing country inclusion in GVCs may not be desirable. Value chain development and inclusion of developing countries should not be taken as a “must do”; a hands-off approach should, for example, be applied in situations in which a sufficient level of development has already been achieved, or in which intended beneficiaries will most likely not benefit or benefits will only materialize for actors dominating the chain.

To develop strategies for the inclusion of developing countries in GVCs, it is important to first understand how such inclusion can actually be achieved. The following scenarios ought to therefore be considered:

- Lead buyers that control access to consumer markets via branding, design and preferential access help suppliers in developing countries apply the technology required to produce primary and intermediary products of sufficient quality and volume. Depending on the lead buyer's position, the introduction of technology can be subsidized by the lead buyer or the costs left to the suppliers. Costs may also accrue from training and advisory services necessary for building important skills among networks of suppliers.
- Lead buyers impose quality criteria and standards that developing country suppliers must comply with. Investments to achieve compliance are left to the suppliers who may receive support from the government and/ or development agencies. When lead buyers face

limitations in sourcing the product, they may subsidize support for compliance achievement. However, compliance with standards does not necessarily mean improvements in productivity and profitability for developing country producers; improvements in production usually require additional investments that those supporting standards compliance cannot undertake.

- Governments and development agencies help producers in developing countries import and use advanced knowledge and technology which enables them to comply with lead buyer conditions. Often, support is provided to identify and access appropriate buyers. Joint marketing via export consortia and joint sourcing of inputs and equipment are further measures to support developing country producers in programmes that aim at reducing lead buyer dependence.
- Producers in developing countries engage in (and copy) research and development to build new and/or improved products in better ways (through new processes). This type of upgrading enables developing country producers to reduce dependence on lead buyers and engage in new markets with a more diversified portfolio, thus reducing vulnerability. Such upgrading is usually costly and requires the mobilization of innovative capacities within developing countries.
- Foreign investors (often connected to the lead buyers or competitors abroad) directly invest in setting up production in a developing country. For the country, this may mean gaining market shares in the supply of primary and intermediary products or even functional upgrading, entering segments of higher value addition.

In summary, as globalization advances, the significance of GVCs in economic development rises and it is no longer a question of whether but of *how* developing countries can participate in GVCs and to make the most of opportunities and to overcome challenges that may arise. UNIDO has been carrying out applied research on different aspects of GVCs using both positive and normative approaches for over two decades. The following chapter introduces the gist of what we have learned from the research.

3. EMPIRICAL EVIDENCE ON GLOBAL VALUE CHAIN DYNAMICS AND DEVELOPING COUNTRY INCLUSION

The dynamics of global value chains have been subject of scholarly research for nearly three decades, and UNIDO has contributed substantially to the empirical evidence of this field of study. While some of the research is based on empirical data on trade of intermediary goods, other studies use GNP data on manufacturing added value. Some of those studies also make reference to the development of foreign direct investment and proxies on progress in innovation, science and technology. The picture that these studies generally paint is diverse and not always consistent. However, some important conclusions on global value chains, their dynamics as well as their impact on developing countries can be drawn from the body of research and are presented in the following sections.

3.1. The Rise of GVCs

The importance of GVCs in international trade has significantly increased since the mid-1980s (Nixson, 2015). Foreign contents of exports have been rising in most countries; services value added in exports is also on the rise (OECD, WTO and UNCTAD, 2013). World exports of intermediate goods surpassed the combined values of final and capital goods exports in 2009 (Gereffi, 2015, referring to WTO and IDE-JETRO, 2011, p. 81).

The rise of GVCs coincided with the fall of trade barriers. Developing countries liberalized their trade regimes from the 1980s onwards due to the stalemate in import substitution strategies in the face of the deterioration of macroeconomic conditions, pressure from the “Washington Consensus” led by the IMF and the World Bank, and a shift in the global operations strategy of multinational corporations through foreign direct investments.

During the heyday of import substitution strategies in the 1960s and 1970s, multinational corporations, which enjoyed the protection of host countries, often adopted a polycentric attitude towards their global operations in the classification of Perlmutter (1969), in which they applied host country-specific strategies and managed relatively autonomous subsidiaries separately (Haraguchi, 2005). The shift of developing countries from import substitution to export orientation strategies and the general fall of trade barriers subsequently led to multinational corporations adopting so-called geocentric strategies towards their global operations, increasing headquarters’ influence for better coordination between headquarters and the subsidiaries and among the subsidiaries along the value chain.

The abovementioned studies explored the rise of GVCs from the trade perspective. UNIDO’s research in this field has also analysed the emergence of GVCs from a production perspective,

focusing on GVC contribution to manufacturing value added. The following section presents some original research conducted by UNIDO along these lines.

3.2. GVCs and Industrial Development: Global Dynamics

3.2.1. Sources of Manufacturing Value Added by Region

This section presents figures that illustrate recent trends in the creation of manufacturing value added by (broad) regions of the world using input-output techniques. Figures 3.1 to 3.11 present each region's added value in different manufacturing sub-sectors in 1990 and 2011. Each figure includes three sources of value added: production of final outputs for domestic consumption (blue), exports of final outputs (red) and exports of intermediate goods for foreign production (green).⁵ The last source, in particular, can be considered a proxy of the corresponding region's participation in GVCs. Between 1990 and 2011, reliance on external markets for manufactured exports increased in all regions and most industries (red plus green areas). The dependence of less industrialized regions' manufactured exports on foreign markets, in particular, tends to generally be higher. One exception is South America, where manufacturing industries are domestic-oriented.

Though the domestic or export orientation of manufacturing industries differs by region, some commonalities are evident across regions. The food and beverages industry is strongly domestic-oriented in all regions relative to other industries. Industrialized regions or regions with high or growing manufacturing value added shares in GDP (as illustrated in Table 3.1) tend to have higher shares of export contribution (including both exports of final outputs and intermediates) to the value added of textiles and wearing apparel, electrical machinery or transport equipment production. Other regions, especially resource rich ones, usually have higher shares of export contribution to the value added of petroleum, chemical and non-metallic or metal production.

No clear patterns may be visible in the relationship between manufacturing development (as the share of manufacturing in GDP in Table 3.1) or the determinants of manufacturing value added (whether from domestic sales of final products, exports of final products or exports of intermediate goods). However, when we look at developing regions that have recorded a significant increase in manufacturing's share of GDP (i.e. North African and the Middle East, South and South East Asia and Eastern Europe as shown in Table 3.1), they seem to share some characteristics. These developing regions have a relatively large export contribution (sum of exports of final products and intermediate goods) to manufacturing value added, and within this export contribution, the shares of final products (red) is quite significant. For example, Central America and South America have a relatively low overall export contribution to their manufacturing industries, with the exception of Central America's textile and wearing apparel industry (which experienced very rapid growth from 1990 to 2011). While Sub-Saharan Africa and Central Asia (mostly post-Soviet states, see Table 3.1) had a high contribution of exports to manufacturing value added, their exports mostly entailed the production of intermediate goods

⁵ "Domestic consumption" here means consumption within a single region while "foreign" indicates other regions.

for foreign producers (i.e. participation in GVCs) and very few final products were exported unlike in the case of North Africa and the Middle East, South and South East Asia and Eastern Europe – all regions with a significant increase in manufacturing’s share of GDP (Table 3.1). Thus, regional experiences seem to indicate that export contribution to manufacturing value added could promote industrialization if it is driven by the development of export capacity of final products without being totally dependent on GVCs as the only exporting channel.

North Africa and Middle East

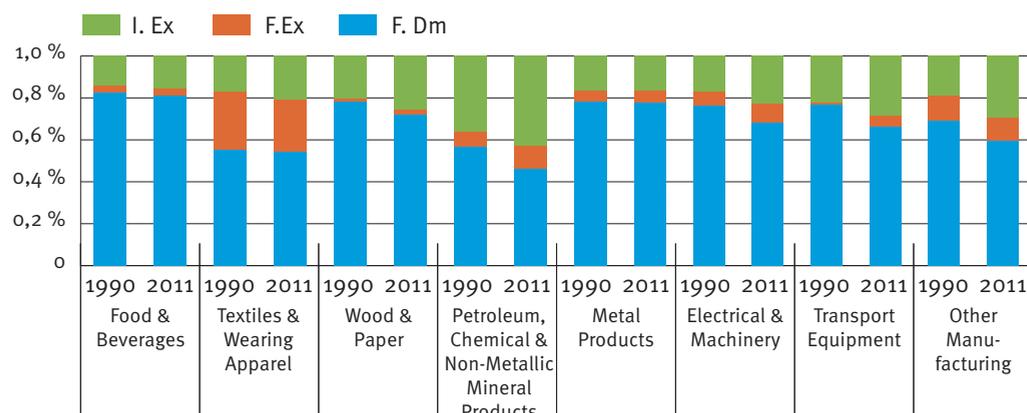


Figure 3.1. Distribution of Value Added by use and per industry. North Africa and Middle East. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

Sub-Saharan Africa

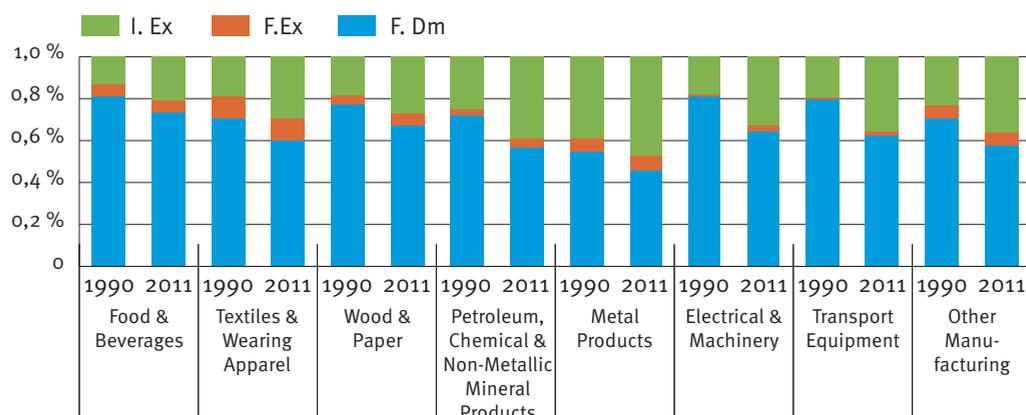


Figure 3.2 Distribution of Value Added by use and per industry. Sub-Saharan Africa. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

West Europe

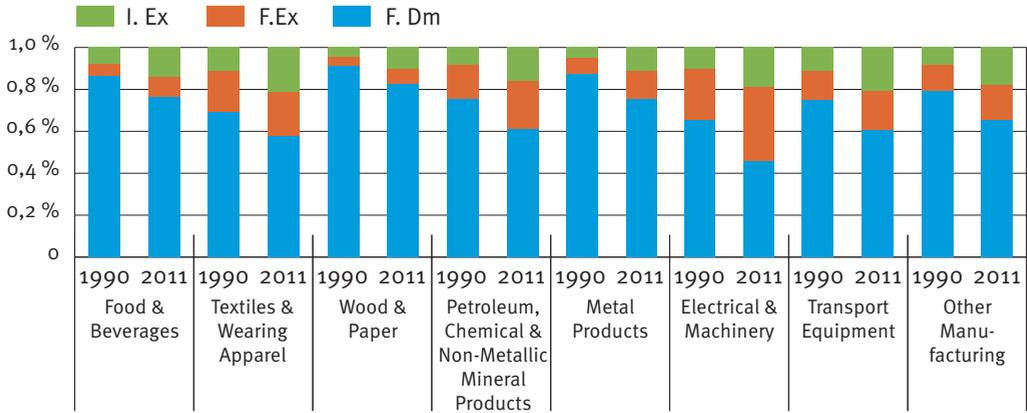


Figure 3.3 Distribution of Value Added by use and per industry. West Europe. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.
Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

East Europe

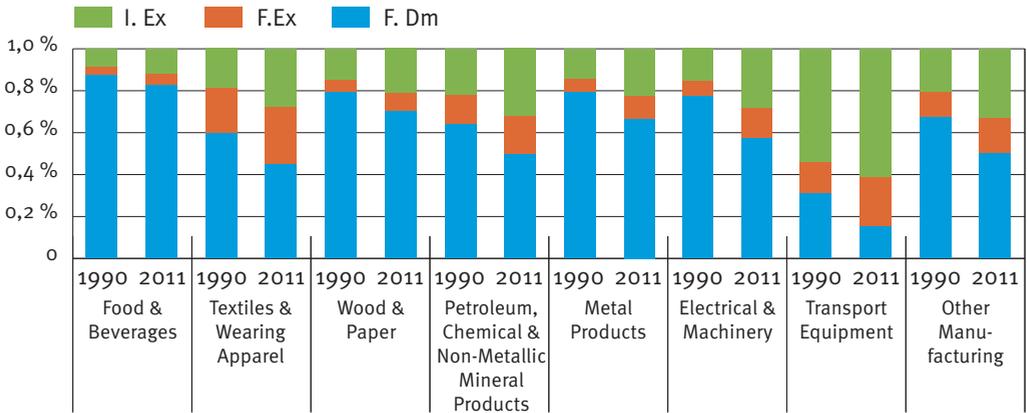


Figure 3.4 Distribution of Value Added by use and per industry. East Europe. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.
Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

Central Asia

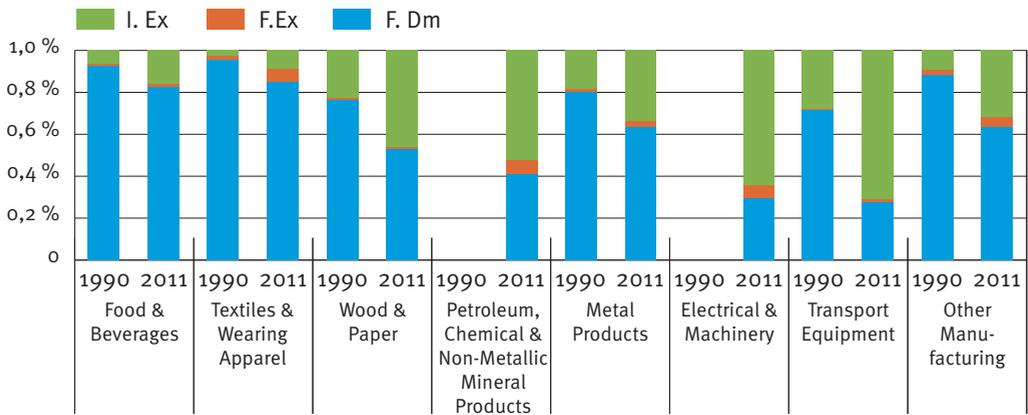


Figure 3.5 Distribution of Value Added by use and per industry. Central Asia. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

East Asia

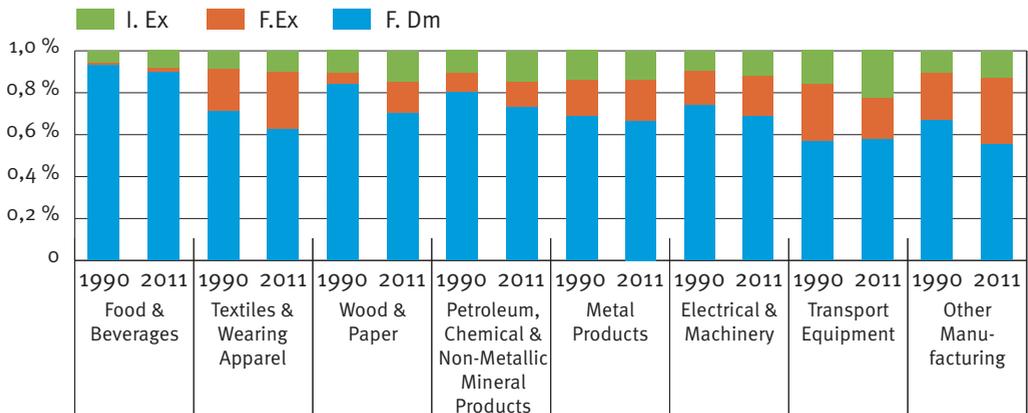


Figure 3.6 Distribution of Value Added by use and per industry. East Asia. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

South and South East Asia

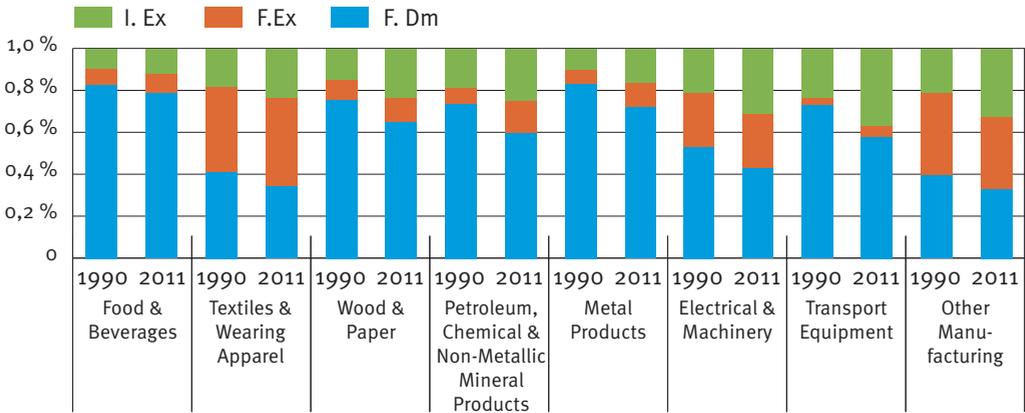


Figure 3.7 Distribution of Value Added by use and per industry. South and East Asia. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.
Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

Oceania

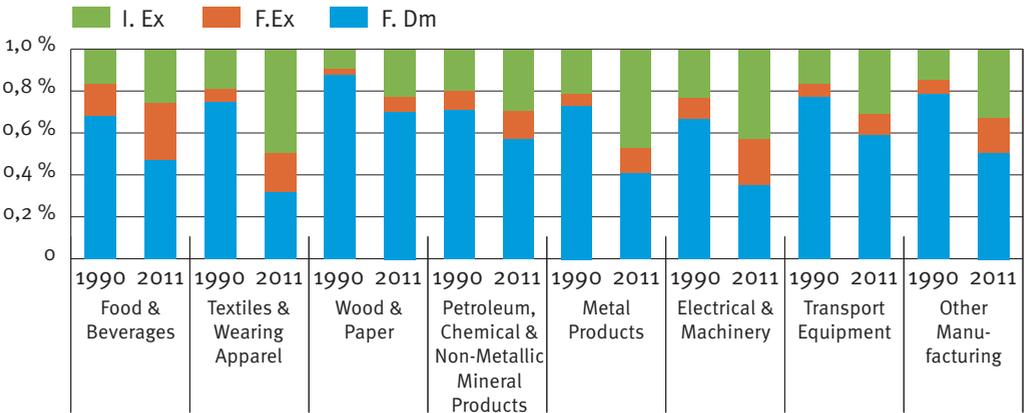


Figure 3.8 Distribution of Value Added by use and per industry. Oceania. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.
Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

North America

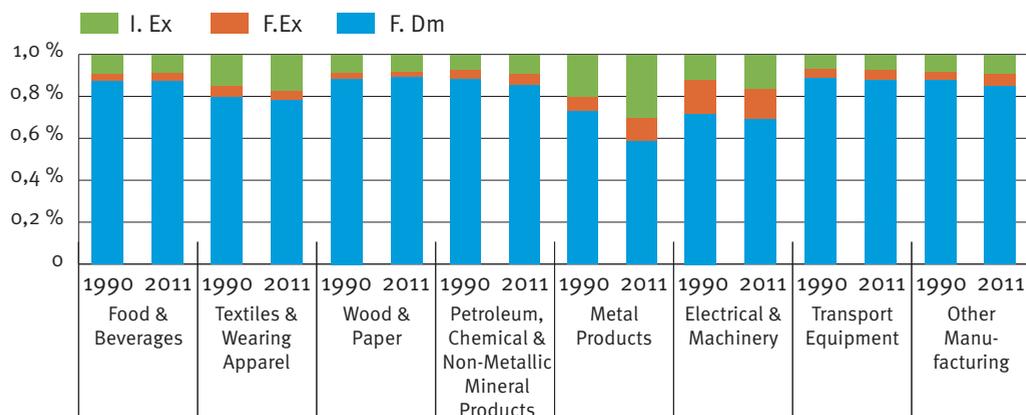


Figure 3.9 Distribution of Value Added by use and per industry. North America. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

Central America

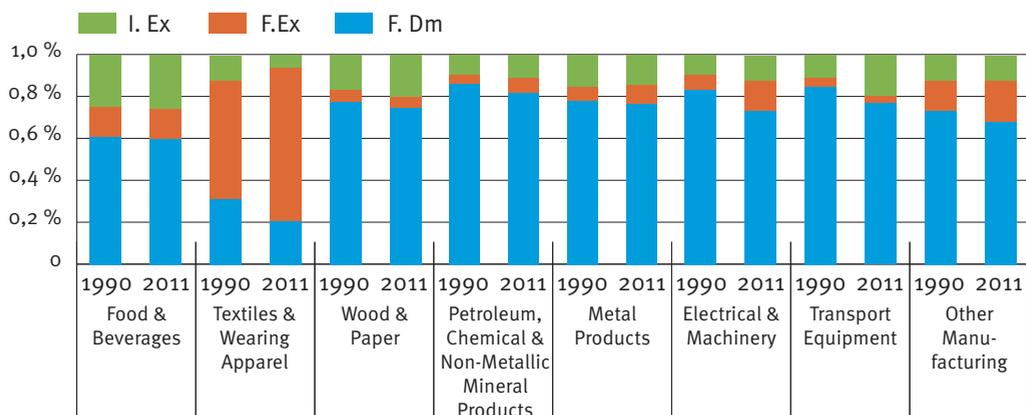


Figure 3.10 Distribution of Value Added by use and per industry. Central America. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: UNIDO estimations based on Eora Multi-Regional Input-Output Database.

South America

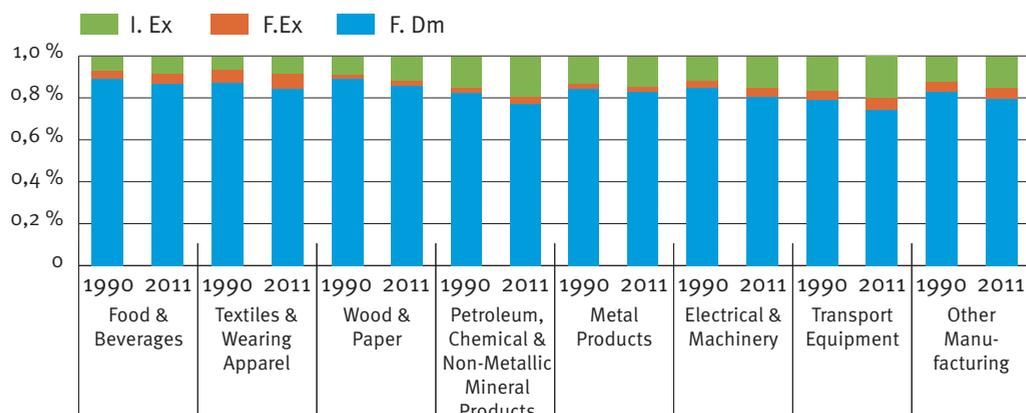


Figure 3.11 Distribution of Value Added by use and per industry. South America. 1990 and 2011.

Note: I. Ex = Exports of Intermediate goods; F. Ex = Exports of final goods; F. Dm = Final domestic consumption.

Source: Own elaboration based on EORA Database.

	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2013
World	16.90%	16.59%	15.97%	16.03%	15.42%	15.56%	15.66%	16.07%	16.24%
Developed (OECD)	17.00%	16.50%	15.71%	15.48%	14.99%	14.98%	14.91%	15.02%	14.92%
Americas	15.86%	15.05%	13.59%	13.32%	12.61%	13.23%	13.30%	13.24%	12.65%
South America	22.00%	18.72%	17.53%	18.16%	17.40%	15.58%	14.53%	13.67%	12.53%
Asia (excl. USSR)	19.26%	18.63%	18.86%	19.17%	19.17%	18.89%	19.47%	21.39%	22.60%
Europe	17.56%	17.34%	16.66%	16.27%	15.65%	15.22%	14.93%	14.50%	14.35%
Africa	14.31%	14.84%	15.05%	16.17%	16.44%	16.93%	16.28%	16.67%	17.00%
Oceania	17.36%	16.30%	15.52%	14.30%	13.06%	12.08%	11.31%	9.97%	8.71%
Developing (Non-OECD)	16.30%	17.03%	17.23%	18.60%	17.44%	18.24%	18.81%	19.54%	19.81%
Americas	18.58%	18.57%	17.60%	17.53%	16.52%	16.25%	15.74%	15.38%	14.27%
North America	5.74%	5.74%	5.74%	5.74%	5.74%	5.74%	5.73%	4.87%	3.04%
Central America	18.45%	18.98%	18.45%	18.29%	17.82%	17.59%	17.22%	16.40%	15.14%
South America	18.61%	18.57%	17.57%	17.51%	16.47%	16.18%	15.66%	15.32%	14.23%
Asia (excl. USSR)	19.45%	21.39%	21.87%	22.84%	23.24%	24.53%	24.99%	26.17%	26.17%
East Asia	32.20%	34.80%	33.40%	31.59%	29.76%	29.73%	29.56%	30.59%	30.41%
South Eastern Asia	16.47%	18.18%	18.79%	20.59%	22.95%	24.74%	25.96%	26.00%	25.39%
South Asia	10.95%	11.58%	11.94%	12.68%	13.12%	14.28%	14.00%	15.08%	14.84%
Europe	19.80%	21.11%	19.46%	20.83%	16.46%	15.72%	16.49%	15.81%	15.23%
Western Europe	12.84%	12.74%	12.67%	12.59%	12.42%	14.52%	17.29%	16.72%	14.85%
Eastern Europe	14.23%	15.40%	15.75%	15.45%	13.72%	15.52%	17.18%	20.19%	22.29%
Former Soviet Union	18.65%	19.63%	18.17%	19.97%	15.97%	15.37%	16.15%	15.40%	14.77%
Africa	7.48%	7.73%	9.17%	10.38%	9.65%	9.90%	10.20%	10.22%	10.26%
N. Africa Middle East	4.86%	5.16%	6.78%	8.56%	8.01%	8.87%	9.52%	9.91%	10.22%
S. Saharan Africa	11.47%	12.37%	13.58%	13.50%	12.65%	11.89%	11.53%	10.81%	10.34%
Oceania	16.75%	14.47%	11.53%	11.85%	10.25%	9.14%	9.20%	9.37%	8.33%

Table 3.1: Manufacturing value added share in GDP by region in constant prices (5-year average)

Source: UNIDO elaboration based on UNSD

3.2.2. Participation in GVCs and Regional Interactions

We now turn to the changing regional nature of GVCs and focus on three specific manufacturing industries: textile and apparel, machinery and electrical equipment and transport equipment. Figures 3.12 to 3.17 present the added value of each of these industries in the different regions between 1990 and 2011. The size of the bubbles represents the relative size of value added generated by each region, while the numbers inside (or next to) the bubbles indicate how much value was added at the regional level to produce final outputs, which are either consumed regionally or exported for final consumption in foreign markets. The arrows represent the main destinations of the respective region's exported intermediate goods. The red numbers next to the arrows signify the value added from these transactions (i.e. participation in GVCs) as a percentage of the region's total value added⁶ (the arrows show the direction of exports of intermediate goods, i.e. value added or numbers in red are generated by exporting countries).

3.2.2.1. Textile and Apparel Industry

In 1990, West Europe, North America and East Asia together produced 73 per cent of the world total value added of textiles and wearing apparel production. If we add South America and South East Asia to the three leading regions, the value added share of the five regions increases to 85 percent.⁷ In 1990, global textile and wearing apparel production was mostly domestic or regionally oriented. In all regions, at least 80 per cent of value added derived from the production of final outputs within the region. There was limited participation in GVCs as indicated by the arrows and numbers in red. East Europe participated in West Europe's production chain and generated 10 per cent of its total value added from this source.

In 2011, the relative importance of North America and West Europe in global textile and apparel production declined. The decrease in their shares of global value added was offset by the increase in shares in East Asia, South and South East Asia and South America. Thus, the sum of the five region's global value added shares (North America, West Europe, East Asia, South and South East Asia and South America) did not change from 1990 and 2011. Although the five region's value added shares remained unchanged (85 per cent), the textile and apparel industry became more globalized in the sense that a number of regions increasingly began to integrate into global production chains (as indicated by the increase in value added shared derived from intermediate exports), which accounted for a higher share in the total value added of many regions, especially developing regions, in 2011 relative to 1990.

How Oceania added value in textile and apparel production changed considerably, for example. In 1990, only 18 per cent of Oceania's value added derived from production for GVCs (100 per cent minus 82 per cent). By 2011, half of the region's total value added consisted of the supply of intermediate goods to foreign producers (i.e. participation in GVCs). The region's dependence increased, especially on production in East Asia. Other regions also increased their share of value added through GVC participation. In 2011, 30 per cent of Sub-Saharan Africa's value added derived from GVC participation (100 per cent minus 70 per cent of value added from the production of final products) – an increase of 11 per cent since 1990. The destinations of intermediate goods supplied by the region were diversified. Unlike North Africa and the Middle

⁶ Only transactions larger than 8 per cent of the region's total value added are shown.

⁷ These percentages are not shown in the figures. They are calculated based on the relative sizes of the bubbles.

East, Sub-Saharan Africa’s dependence on production demands from East Asia increased over 20 years and has become an equally important source of Sub-Saharan Africa’s value added, along with West Europe, each generating 9 per cent of Sub-Saharan Africa’s total value added.

By 2011, Asia became the key region of global textile and apparel production. East Asia’s valued added share in the world increased from 24 per cent in 1990 to 33 per cent in 2011, while South and South East Asia’s share increased from 6 per cent to 10.5 per cent.⁸ In addition, other regions generated a substantial amount of value added by supplying intermediate goods to these regions.

Among developing regions, Central America, South America and Central Asia are exceptions to this globalizing production trend. Their textile and wearing apparel industries remained largely regionally oriented, generating more than 90 per cent of their textile and apparel value added from the production of final outputs within the region in 2011. Strong production links between East and West Europe already existed in 1990 and have strengthened further since.



Figure 3.12: Value added in the textile and apparel industries and participation in GVCs by region in 1990

Source: UNIDO estimations based on Eora MRIO Database

⁸ These percentages are not shown in the figures. They are calculated based on the relative sizes of the bubbles.



Figure 3.13: Value added in the textile and apparel industries and participation in GVCs by region in 2011

Source: UNIDO estimations based on Eora MRIO Database

3.2.2.2. Machinery and Electrical Equipment Industry

Compared with the textile and apparel industry, machinery and electrical equipment had a higher level of value added concentration in the three regions including North America, West Europe and East Asia in 1990, accounting for 85 per cent of the industry's global value added.⁹ Most of the 11 regions in Figure 3.14 did not add much value from participation in GVCs, except for South and South East Asia and Oceania, which generated more than 20 per cent of their total value added from supplying intermediate goods for foreign production. Specifically, they benefited from strong production links with East Asia in 1990, which was also the case for their textile and apparel industries.

In 2011, while North America and West Europe's global value added shares decreased by four and five per cent, respectively, East Asia's share increased from 29 per cent to 32.5 per cent.¹⁰ South and South East Asia, North Africa and the Middle East as well as South America's global value added shares of the machinery and electrical equipment industry rose as well.

⁹ The percentage is not shown in the figures. It is calculated based on the relative sizes of the bubbles.

¹⁰ These percentages are not shown in the figures. They are calculated based on the relative sizes of the bubbles.

Although the three leading regions— North America, West Europe and East Asia—continue to retain 77 per cent of the industry’s global value added and generate more than 80 per cent of their value added from the production of final outputs within the respective regions, the significance of GVCs has increased since 1990 from the perspective of developing regions. Oceania and South and South East Asia further strengthened their production links with East Asia while East Europe did the same with West Europe’s. Central Asia’s machinery and electrical equipment industry has become part of Europe and East Asia’s production chains. Sub-Saharan Africa significantly increased its share of value added derived from participation in GVCs of West Europe and the geographically distant region of East Asia. Similar to the case of the textile and apparel industries, the Americas retained their strong regional orientation, and even the developing regions of Central and South America still added more than 85 per cent value from the production of final outputs within their respective regions. In comparison to the textile and apparel industry, developing regions’ machinery and electrical equipment industries are more integrated into GVCs.



Figure 3.14: Value added in machinery and electrical equipment industry and participation in GVCs by region in 1990

Source: UNIDO estimations based on Eora MRIO Database



Figure 3.15: Value added in machinery and electrical equipment industry and participation in GVCs by region in 2011

Source: UNIDO estimations based on Eora MRIO Database

3.2.2.3. Transport Equipment Industry

In 1990, global value added of the transport equipment industry was even more concentrated in the three leading regions, North America, West Europe and East Asia, than that of the machinery and electrical equipment industry which in turn had a higher concentration than the textile and apparel industry. The three regions accounted for 88 per cent of the industry's global value added.¹¹ Unlike the other two industries, most developing regions had already established strong production links with the leading regions in their geographical proximity. In the case of East Europe, for example, the region was already part of the production network of West Europe. Even East Asia, one of the major regions of transport equipment production, derived 8 per cent of its total value added by supplying intermediate goods to North America.

Twenty years later, the three major regions continue to capture more than 80 per cent of the industry's share of world value added. However, from each region's perspective and how value added was generated (as shown in Figure 3.17), the integration and interdependence of the global transport equipment industry among regions increased much more than that of the textile and apparel industry and that of the electrical machinery industry. Central Asia's participation

¹¹ This percentage is not shown in the figures. It is calculated based on the relative sizes of the bubbles.

in GVCs increased tremendously, along with a rapid decline of final output production from 72 per cent to 29 per cent in the industry’s value added share. In 2011, over two-third of the region’s value added derived from the supply of intermediate goods to production in the three major regions. The same development took place in South and South East Asia, which showed strong production linkages with all three major regions. Since 1990, Sub-Saharan Africa’s value added share derived from final output production within the region has decreased by 17 per cent and its dependence on production demands from North America rose, which became an important source of Sub-Saharan Africa’s value added in addition to the traditional production demands from West Europe.

As shown in Figure 3.17, North America has become the key driver of value added creation in other regions. Except for North Africa and the Middle East, regardless of geographical proximity, all other regions have significant levels of participation in GVCs which are driven by production demands from North America.



Figure 3.16: Value added in transport equipment industry and participation in GVCs by region in 1990

Source: UNIDO estimations based on Eora MRIO Database



Figure 3.17: Value added in transport equipment industry and participation in GVCs by region in 2011

Source: UNIDO estimations based on Eora MRIO Database

3.2.3. Impact of GVC Participation on Industrial Development

The analyses of the three industries indicate that integration into GVCs can be positive or negative for regions' industrial development. South America's value added structure remained relatively independent from GVC production and the region increased its world value added shares in all three industries over the 20 years studied here. South and South East Asia also significantly increased their world value added shares in the three industries while GVCs became a relatively important source of their value added during the study period. While Sub-Saharan Africa and Central Asia also increased their participation in GVCs, their world value added shares did not change and they remained minor producers in the three industries. In other words, joining GVCs per se may not necessarily boost a region's value added activities relative to that of other regions. As discussed at the beginning of this section, the capability to export final products seems to remain important, even in periods of greater integration of manufacturing production in GVCs. Furthermore, in terms of contribution to manufacturing value added rather than to trade, domestic or regional value chains continue to play a much more important role than global value chains in the majority of regions.

3.3. GVCs and Industrial Development: Sectoral Dynamics

UNIDO has also undertaken a number of studies on the main characteristics of specific value chains and the relationship between foreign multi-national enterprises (MNEs) and domestic firms to draw policy implications. These types of studies are particularly interesting because they shed light on the nature and determinants of a country's productive and technological capabilities and its competitive performance (UNIDO, 2004). By focusing on all links in the value chain, it becomes easier to distinguish activities that are subject to raising or decreasing returns and to understand the nature and dynamics of innovation. It is also important to understand the governance and type of relationships that operate within specific value chains. That is, it is important to understand the structure of the value chain, to identify the characteristics of the leading firms and how they might wish to incorporate developing country producers in these value chains.

Such an analysis typically addresses questions such as:

- What type of work is allocated to developing countries and firms in the value chain?
- Will such work sustain jobs and incomes?
- Does the value chain allow upgrading by developing country producers?
- What are the strategies and policies that can help developing countries successfully leverage their participation in GVCs to enhance productivity and increase welfare gains?

To address these questions, four specific areas of research are of particular relevance: i) types of GVCs; ii) leveraging channels; iii) firm relationships (governance structure); and iv) innovation opportunities. In what follows, we provide details on each of these areas and briefly present UNIDO's main findings in the research areas.

3.3.1. Types of GVCs

As already stated before in this report, two main GVC types can be identified: buyer-driven and producer-driven value chains. This is an important distinction because the dynamics of the relationships and interactions they generate differ.

In buyer-driven value chains, large buyers with core competencies in branding and marketing are the driving actors in the establishment of the value chain. These firms generally design and/or market—but do not produce—the branded products they order and are therefore “manufacturers without factories”. Profits typically come from combinations of high-value research, design, sales, marketing and financial services that allow the retailers, designers and marketers to act as strategic brokers in linking overseas factories with product niches in their main consumer markets. Buyer-driven value chains are characterized by highly competitive and globally decentralized factory systems with low entry barriers. These chains are typical for labour-intensive industries and are highly relevant for developing countries.

In producer-driven value chains, the key producers in the chain control essential technologies, which are of crucial importance for positioning in the final market. They coordinate the value

chains and take responsibility for supporting their suppliers' and customers' efficiency efforts. The lead firms usually belong to international oligopolies and profits come mainly from scale, volume and technological advances. These chains are typical for medium- and high-tech industries such as automobile, electronics and telecommunications.

The characterization conducted by UNIDO for the apparel industry (Gereffi and Memedovic, 2003) and the furniture industry (Kaplinsky et al., 2003) provide interesting examples of buyer-driven GVCs.

3.3.1.1. Apparel Industry

According to Gereffi and Memedovic (2003), the apparel industry is an ideal industry for examining the dynamics of buyer-driven value chains. There is an unparalleled diversity of garment exporters in developing countries, which have extensive backward and forward linkages and help account for the large number of jobs associated with this industry. Given the buyer-driven nature of this global value chain, a very important issue to examine relates to global buyer types. These are the intermediaries between global consumers and the local manufacturers. As such, they play a central role inserting local industries into GVCs. The authors of the study distinguish three categories of buyers: retailers, branded marketers and branded manufacturers.

Global retailing in the apparel industry is dominated by large organizations that are developing greater specialization by product (specialized stores selling only one item, such as clothes or shoes) and are developing strong ties with global suppliers, particularly in low-cost countries. Technological change and superior information flows allow them to demand (and control) better inventory management from their suppliers, faster response and more frequent delivery. Since the 1980s, many retailers have also begun to compete directly with the national brand names of apparel producers and marketers by expanding their sourcing of "private label" merchandise. These products are sold more cheaply than the national brands. Hence, international retailers such as Wal-Mart and Sears Roebuck, which used to be apparel manufacturers' main customers, are now becoming their competitors.

Brand marketers, instead, are well known manufacturers without factories as they are not engaged in production. They only design and market their goods. Examples include athletic footwear companies such as Nike, Adidas and Puma, and fashion-oriented apparel companies such as The Gap and Liz Claiborne. As pioneers in global sourcing, they provided knowledge that later allowed overseas suppliers to upgrade their own positions in the apparel chain. To deal with new competition, branded marketers have discontinued some support functions (such as pattern grading and sample making) and are reassigning them to contractors. They instruct contractors on where to obtain necessary components, reducing their own purchase and redistribution activities. They are decreasing their supply chains, using fewer but more capable manufacturers and are adopting more stringent vendor certification systems to improve performance. Marketers (and retailers even more so) are now recognizing that overseas contractors can manage all aspects of production, which offers linking and leveraging opportunities for contractors to move into designing and branding.

Branded manufacturers are offshore suppliers, usually in neighbouring countries with trade agreements that allow goods assembled offshore to be re-imported with a tariff charged only on the value added of foreign labour. Another trend among branded manufacturers is also less engagement in production and more involvement in marketing by capitalizing on brand names and retail outlets.

The study also examined how developing countries can improve their position in apparel GVCs. The first step for garment manufacturers in developing countries is to become linked to branded manufacturers. The next move after export processing is to link with global retailers or branded marketers in original equipment manufacturing or full-package production. Compared with the mere assembly of imported inputs, full-package production fundamentally changes the relationship between buyer and supplier in a direction that gives far more autonomy and learning potential for industrial innovation to the supplying enterprise. Full-package production is needed because the retailers and marketers that order the garments have limited knowledge of their manufacturing details. Hong Kong SAR China, Taiwan Province of China, the Republic of Korea and China, for example, used the full-package route to create an enduring edge in export-oriented development. Manufacturers from developing countries who want to advance to this stage need to acquire the skills and resources to move into the more diversified activities associated with full-package production. The arrangement offers further innovation opportunities towards own brand manufacture. It enhances the ability of local entrepreneurs to learn the preferences of foreign buyers, including international standards for the price, quality and delivery of export merchandise. It also generates substantial backward linkages in the domestic economy because original equipment manufacture contractors are expected to develop reliable sources of supply for many inputs, including those to be imported. The supplier learns much about the downstream and upstream segments of the apparel commodity chain from the buyer. This tacit knowledge can later become a powerful competitive weapon.

According to the study, one of the most important mechanisms facilitating the shift to higher value-added activities for mature export industries like apparel in East Asia is the process of “triangle manufacturing” (global logistics contracting). The essence of triangle manufacturing, initiated by East Asian countries in the 1970s and 1980s, is that global buyers place their orders with manufacturers they have sourced from in the past; those manufacturers then shift some or all of the requested production to affiliated offshore factories in low-wage countries (such as, for example, China, Guatemala and Indonesia). These offshore factories can be wholly owned subsidiaries, joint-venture partners or simply independent overseas contractors. The triangle is completed when the finished goods are shipped directly to the overseas buyer under the U.S. import quotas issued to the exporting nation. Triangle manufacturing thus changes the status of original equipment manufacturers from established suppliers for retailers and designers in the United States to middlemen in buyer-driven commodity chains that can include as many as 50 to 60 exporting countries.

3.3.1.2. Furniture Industry

The study carried out by Kaplinsky et al. (2003) on the wood furniture value chain also provides a good example of a buyer-driven GVC. The authors identify three major buying agents who facilitate the entry of wood furniture producers into global markets: large multi-store retailers with outlets and suppliers in many countries (such as, for example, IKEA); small-scale retailers

who buy directly from a limited number of suppliers in a limited number of countries; and specialized medium-sized buyers who source from many countries and sell on to retail outlets, usually in a single country or region.

The authors examined the “critical success factors” required by each type of buyer. Buyers generally serve different market segments. Often, these segments are distinctively different, but the growing capabilities of world class manufacture means that there is a diminishing trade-off between critical success factors. For example, large retailers are increasingly able to offer low prices and high quality as well as low prices and high variety. Suppliers face a much more demanding set of critical success factors when selling to global retailers than when they sell to small retailers and specialist buyers. Not only are nearly all critical success factors considered important, they are also ranked as being of a higher order importance. Moreover, since the mid-1980s, the growth of various forms of certification has produced new entry barriers. These predominantly relate to process characteristics rather than, as in the case of tariffs, to products. They include quality standards (ISO9000), labour standards (SA8000) and environmental standards. In addition, the ISO14000 quality standard, a wood sector-specific standard (Forestry Sustainability Council, FSC) applies, which relates to environmental practices throughout the chain, whereas ISO14000 only certifies processes within particular links within the chain. These standards are becoming increasingly important, especially for global retailers.

In view of these general features that characterize the furniture GVC, the authors examined the opportunities for developing countries to upgrade within it. They focused on the specific case of South Africa and suggest that the innovation challenges part of the wood furniture GVC in South Africa faces is symptomatic of a more general challenge other furniture exporting countries face. South Africa’s wood furniture GVC has been on a suboptimal trajectory since its pine furniture exports faced increasing price competition in overseas markets. Moreover, though South African products were considered cheap, they were also deemed to be of low quality and of poor delivery reliability. As a consequence, IKEA, the major global buyer, decided to move out of South Africa (turning to Eastern Europe and East Asia).

South African wood furniture firms found an effective response after much searching within the context of the global trend towards environmental responsibility. South Africa is the home of a commercially grown semi-hardwood named saligna. Furniture made from saligna offered the potential of becoming a low-cost and environmentally acceptable alternative to increasingly scarce and highly priced traditional hardwoods such as teak and mahogany.

One of the key dynamic market forces in the global timber products industry has been the shift (primarily by industrial countries) towards environmental responsibility. This jeopardizes the exports of most developing countries because their timber product industries have traditionally drawn on indigenous hardwood forests. South Africa, however, happens to be uniquely placed to take advantage of this opportunity. The most outstanding feature of saligna (a species of Eucalyptus hardwood) is that it is a commercially grown semi-hardwood in South Africa, distinguishing it from other hardwood species grown in indigenous forests in the developing world. Hence, this is also an opportunity that offers the potential to move furniture producers into new market niches with higher unit prices.

According to the authors, grasping this opportunity requires inter-chain innovations, a reorientation from the previous trajectory of the wood furniture GVC, which has traditionally focused on the export of pine furniture into increasingly price competitive markets. This reorientation entails substantial inter-chain innovation through simultaneous and carefully coordinated process, product and functional innovations.

3.3.2. Foreign Direct Investment and Spill-overs to Host Countries

The linkages between domestic producers and foreign partners in GVCs can assume different forms. These range from traditional foreign direct investment (FDI) to new forms of investments in which foreign investors do not have interests in control through equity participation, but involve at least one element of investment. Examples of the latter are subcontracting, co-production, licencing agreements and strategic partnerships for technology development. Furthermore, there are also more informal types of technology transfer, knowledge exchange and learning.

In the specific case of FDI, it is very important to analyse whether the presence of multinational firms has a positive impact on domestic firms. This is a topic that has been extensively addressed in UNIDO research. In recent years, a number of UNIDO studies has looked at this relationship in the specific case of African countries using a firm-level survey conducted by UNIDO (Amendolagine et al., 2012; Boly et al., 2012; Görg and Seric, 2013; Pérez-Villar and Seric, 2013).

Amendolagine et al. (2012) investigate the type of FDI that maximizes the likelihood of creating local linkages between MNEs and domestic suppliers within the context of Sub-Saharan African countries. The study examines the relevance of foreign firms' characteristics and of the macroeconomic environment of the host country. Firm characteristics include industry, mode of entry, motives of investment, age, skill composition of the foreign affiliates' workforce, country of origin, size, degree of local management autonomy and type of ownership (such as ownership by a member of a diaspora). Host country characteristics include GDP size, importance of natural resources and quality of legal system. The authors also analyse the role of Investment Promotion Agencies and Regional Trade Agreements in promoting links between foreign investors and local producers.

The study finds that foreign subsidiaries in Africa increase their linkages with local firms over time. This implies that the currently low level of linkages might, at least partly, be explained by the relatively recent history of FDI on the continent. A higher degree of interactions with local firms is generated by foreign subsidiaries with a local partner, a final market orientation and by brownfield rather than greenfield investments. Interestingly, investments made by members of the diaspora are associated with more linkages with domestic firms. The analysis also shows that foreign firms with a knowledge base that is too advanced with respect to the absorptive capacity of the domestic economy are less conducive to interactions with domestic economic agents. The latter finding emphasizes the importance of attracting foreign firms that have a real potential of 'fertilizing' already existing domestic capacities rather than attracting highly sophisticated firms with the hope of observing an unrealistic leapfrogging of the domestic economy. Finally, the results of the study also confirm the importance of good institutions and,

in particular, a reliable legal system as preconditions for boosting the linkages generated by foreign subsidiaries with domestic firms.

Following this line, Pérez-Villar and Seric (2013) examine the effects of institutional quality on the creation of domestic linkages in more detail. The authors argue that the relevance of the host country's institutional quality for foreign investors' local sourcing decision might not necessarily be the same for all investors, because the home country's institutional environment plays a crucial role in this regard as well. That is, institutional proximity makes it easier for the multinational to cope with the new environment by facilitating labour relationships and networking with local firms. Such multinationals will therefore perceive interactions with the local manufacturers as less risky. Putting it in terms of transaction costs, a foreign investor faces lower uncertainty if the procedures and rules governing economic exchange in the home country are similar to those in the host country. In other words, the larger the institutional distance between the host and the home country, the higher the transaction costs for the foreign investor and hence, the less likely the interaction with domestic suppliers. This assertion and the notion of institutional distance directly relate to the special features of South-South FDI flows and its effects on the host country.

The main findings of this study are the following: first, emerging multinationals generate more linkages with domestic firms, on average, relative to northern multinationals, independently of institutional distance. Second, northern multinationals care more about institutional distance relative to southern firms. Additional analysis reveals that this result is not only attributable to the smaller institutional distance of southern firms in our sample, but indicates a lower degree of risk aversion among southern firms relative to northern ones. Finally, institutional distance plays a significant role in the generation of linkages by northern multinationals but only for firms for which access to local suppliers is very important or crucial. In this case, the authors find an inverted U-shape relationship between linkages and institutional differences, with the attractiveness of local supplying offsetting the negative effect of institutional distance until reaching a threshold after which institutional distance is too large and the impact on the domestic linkage turns negative.

Boly et al. (2012) go one step further and analyse the main characteristics that can make domestic firms in Sub-Saharan Africa (net) *winner*s or *loser*s from the presence of FDI, and explore the channels through which multinational enterprises have an impact on the local firms: products' market, input availability and costs, access to finance and export opportunities. They also analyse the strategic reaction of domestic firms induced by the presence of foreign affiliates.

This study also finds that larger, newly established and more productive domestic firms are more likely to benefit from interactions with foreign affiliates. Inward FDI in Sub-Saharan Africa (SSA) seem to favour domestic firms with an upstream market orientation (suppliers of intermediate goods and services) rather than suppliers of final consumer goods (downstream market orientation). Direct supplier relationships with foreign affiliates boost the likelihood of domestic firms reporting overall gains from FDI. However, the authors find that the extent to which domestic firms benefit from these interactions mainly depends on the "quality" (as measured by established long-term relationships) instead of the sheer 'quantity' (number of foreign suppliers) of linkages. The net impact of FDI on domestic firms also depends on

the macro-economic environment within which domestic and foreign firms operate. A higher quality of the business environment increases the likelihood of positive effects. A larger size of the manufacturing sector and a larger stock of FDI in the destination country are also associated with positive net gains. Finally, better access to foreign markets, as proxied by the costs of exports over imports, seems to significantly increase the ability of domestic firms to reap the benefits from FDI inflows.

In terms of domestic firms' strategic reactions to the presence of foreign affiliates, the study finds evidence that a large number of domestic African firms react by "imitating" foreign firms, mainly by producing similar products and/or applying similar marketing strategies. Interestingly, the self-reported "winners" from FDI inflows are more likely to be associated with the adoption of imitation strategies. On the contrary, the (net) losers from FDI are more likely to remain idle, i.e. without reacting strategically at all or reacting to the foreign presence by shifting to different (complementary) products. Although family businesses and small enterprises which constitute the backbone of most African countries' economies are more likely to be net losers from FDI, the authors find them to be strategically more responsive to foreign firms' entry than larger domestic firms. They also find some evidence that the size, and even more importantly, the 'quality' of linkages between domestic and foreign firms boost the likelihood of "learning by imitation". The study therefore suggests that FDI inflows play an important stimulus for structural change in SSA.

Görg and Seric (2013) address a similar issue but from a different perspective in their study. They examine the link between domestic firms' business relationships with multinationals and their performance in terms of innovation and productivity. These links take two forms; a domestic firm may either supply inputs to a multinational (backward linkage) or purchase inputs from a multinational located in the host country (forward linkage).¹² When analysing the vertical spill-overs stemming from this type of link, most of the literature focuses on aggregate input-output tables. Hence, which domestic firms have linkages and which ones do not cannot be pinpointed; only the strength of an industry's linkages can be determined. This study, instead, uses detailed information at the firm level to determine whether domestic firms engage in forward and backward linkages with foreign-owned multinationals in the country (measured in terms of percentage of output sold to and bought from multinationals, respectively). Thereby, it is also possible to account for important firm-level heterogeneity among firms with and without linkages. The authors also focus on the mechanism through which linkages can take place and the significance of assistance received for domestic firms from either the government or from multinational customers/suppliers. In particular, they investigate whether the relationship between firm performance (in terms of productivity, product and process innovation) and the customer/ supplier relationship with the multinational depends on whether i) the domestic firm received investment support services from the government; or ii) assistance from a multinational customer in terms of workforce upgrading or technology transfer.

The results of the study are in line with the notion that domestic firms in African countries can achieve positive spill-overs through backward linkages, and to a lesser extent, also through forward linkages. It finds that supplying to a foreign multinational in the country (backward linkage) is positively associated with product innovation in a domestic firm. Buying from a multinational (forward linkage) is positively associated with labour productivity. These

¹² Here, backward and forward linkages refer to the the viewpoint of multinational corporations.

results are not influenced by any form of government support or any assistance received from multinationals. This form of support plays an important role as well, however. According to the study's estimations, domestic firms' process innovation activity is only positively associated with supplying a multinational if the firm also receives assistance from the government for match making, technology upgrading or searching for staff, or from their multinational customer for workforce upgrading. Furthermore, supplying a multinational is only positively associated with domestic firms' productivity if the firm received technology transfers from multinational customers.

3.3.3. Firm Relationships and Governance Structure

The relationship between local producers and global lead firms in the GVC can take very different forms. The following relationships have been identified in the literature (UNIDO 2004):

- **Market-based relationships:** producers and buyers have no personal relationships, as is the case, for example, for exports of many primary commodities.
- **Network-type relationship:** producers and buyers are engaged in any of the following network relationships:
 - **Modular relationship:** arises when the product architecture is modular and technical standards are reducing component variation by unifying component, product and process specification or when suppliers have the competence to supply full packages and modules.
 - **Relational interaction:** involves a complex interaction between the buyer and seller which often creates mutual dependence. This might be managed through reputation or family and ethnic ties. This type of interaction is expected, for example, when product specification cannot be codified, transactions are complex and the supplier's capabilities are high.
 - **Captive relationship:** occurs when small suppliers are transactional-dependent on larger buyers. The switching costs for suppliers are significant and they are then "captive". These suppliers are usually confined to a narrow range of tasks (for example, assembly) and are dependent on the lead firm for complementary activities such as design, logistics, component purchasing and technology upgrading.
- **Hierarchical relationships:** These can be of two types:
 - **Quasi-hierarchical:** occurs when the two parties are not joined by ownership but engage in a long-term relationship.
 - **Vertically integrated:** a traditional FDI relationship that takes place in a vertically integrated production chain.

The specific type of relationship thus depends on the characteristics of the value chain and the different actors involved. Where final markets do not need customized inputs, leading players will prefer to purchase inputs on an arm's length basis on global markets. Yet where

markets demand more standardized inputs, they often choose long-term relationships with reliable suppliers who meet their standards. When necessary, they will help these suppliers reach the desired standards, but this is only a second-best alternative for the lead firm. It is only when their discrete competencies are involved or where the transaction costs of helping suppliers are too high that they will internalize operations in the value chains they control and coordinate.

The participation of Asian countries in the textile industry provides an interesting example of how this type of relationship can change over time. Over a few decades, Asian producers were able to get out of their captive relationships with foreign partners in the apparel value chain (which only expected capabilities from producers to assemble cut fabrics following detailed instructions provided by the buyers). Increasingly, they began to take part in relational value chain interactions that called for higher competences of suppliers in full package production and more autonomy (i.e. capabilities to interpret designs, make samples, source the needed inputs, sustain product quality, meet price and on-time delivery requirements). This has allowed the generation of backward linkages with the domestic economy and the development of a more integrated domestic industry. This has also allowed knowledge exchange (especially of tacit knowledge) for building personal relationships and for learning how to make competitive consumer goods for the international market (UNIDO, 2004).

3.3.4. Innovation and Upgrading Opportunities

One major consequence that is often drawn from the analysis of GVCs is that developing country producers need to upgrade if they wish to participate in GVCs and reduce the adverse effects of the power of buyers and manufacturers. Upgrading is typically related to the improvement of a firm's productivity and competitiveness and can be understood as building technological and managerial capacity that allows local players to participate effectively in value chains. Four kinds of upgrading can be distinguished (UNIDO, 2004):

- **Process upgrading** or improving the efficiency of internal processes, such that these are significantly better than those of rivals in individual links in the chain (for example, cutting the cost of inventories, lower scrap) and between the links in the chain (for example, more frequent, smaller and more timely deliveries).
- **Product upgrading** or improving old products through quality and price performance as well as through time to market, or differentiating by introducing new products faster than rivals. This involves changing new product development processes in individual links in the value chain and in the relationship between different chain links.
- **Functional upgrading** implies raising value added by changing the mix of activities conducted in the firm.
- **Inter-chain upgrading** assumes moving to a new, more profitable value chain, where higher rents can be captured (for example, firms in Taiwan Province of China moved from the manufacture of transistor radios to calculators, to TVs, to computer monitors, to laptops and now to Wireless Application Protocol phones (WAP)).

Additionally, **organizational upgrading** (the organization of producers and processors in business units such as cooperatives and joint businesses), **territorial upgrading** (a focus on a certain locality or underdeveloped regions) and **structural upgrading** (which deals with firm size and business structures) can be named here (UNIDO, 2009b).

Taking the global furniture value chain as an example, Kaplinsky et al. (2008:50) show that in buyer-producer relationships based on simple purchasing contracts, upgrading is a crucial process for developing country producers to participate in the value chain; in their words, “buyers reward producer upgrading by increasing orders”. In some cases, local producers can also try to upgrade in such a way that they develop their own value chains to reach consumers in global markets, but this requires substantial support from the government and development agencies for a longer period of time. More commonly, local producers in less developed countries are approached by larger buyers and retailers who continuously restructure the scope of their activities within the globalization process, searching to collaborate with new suppliers.

This is an important point to take into consideration. In GVC analysis, it is often implicitly assumed that any form of firm insertion into a GVC is potentially beneficial for the local firm in terms of technological learning and innovation. However, this is not the case as Section 3.1 reveals. A positive outcome depends on governance patterns and power relationships characterizing the GVC, as well as on the domestic capabilities of the firm.

A background paper for UNIDO’s Industrial Development Report 2016 addresses this issue through an exhaustive literature review on empirical studies that have focused on innovation and upgrading (De Marchi et al., 2015). The authors analyse over 60 studies in total (mainly taken from peer-reviewed journals from 2005 onwards) covering 50 GVC cases. Each case is characterized in terms of three dimensions: i) governance structure; ii) local firms’ degree of innovativeness (in terms of the extent to which firms undertake any form of product, process, organizational and market innovation); and iii) learning mechanisms. The main objective of such a characterization is to examine whether connections exist between the governance structure and innovation opportunities for domestic firms involved in GVCs or what type of learning mechanisms prevail in different GVCs.

Based on this analysis, the authors identify three types of GVCs: a) *GVC-led Innovators*, consisting of innovative local firms which intensively use knowledge sources from within the GVC; b) *Independent innovators*, consisting of innovative firms, but whose learning sources primarily come from outside the GVC; and c) *Weak innovators*, including a large group of scarcely innovative firms, drawing selectively on some of the knowledge sources available within the GVC, but barely using other forms of learning.

Subsequently, they investigate the existence of a relationship between the three GVC types and their patterns of governance (e.g. market, modular, relational, captive or hierarchical as defined above). Although these insights are not clear-cut, some types of governance appear more frequent across the different types of GVCs. In particular, the study finds that captive relationships are more frequent among weak innovators, which is consistent with the nature of this type of governance, where local suppliers are fully under the control of the lead firm and simply comply with the requirements imposed on them, without having the freedom to invest in innovation. Hierarchical relationships are quite frequent across weak innovators and

independent innovators. According to the authors, this can be explained by the very diverse coordination and governance modes that may exist within hierarchical GVCs. At one end, subsidiaries may be fully dependent on headquarters and have no autonomy to undertake innovation initiatives, a condition that often characterizes weak innovators. At the other end, subsidiaries may be given ample mandates to undertake innovation activities independently of the headquarters, a situation that is aligned with the presence of independent innovators. Hence, the extent to which firms manage to learn and innovate within a hierarchical GVC also depends on the nature of the relationship in terms of the autonomy and mandate that exist between headquarters and its subsidiaries.

The study thus concludes that GVCs characterized by exclusively captive or hierarchical governance patterns yield poor impacts on the innovative capacity of their local firms by inhibiting their autonomy and freedom to experiment with different innovative and learning sources.

Over the years UNIDO has conducted both positive and normative research related to the evolution of global value chains and to policy formulation. The findings show that GVCs have become an important means of trade, accounting for nearly half of exported goods and services in many countries. GVCs' contributions to manufacturing value added have also increased significantly, especially in developing countries, over the last two years. Not only have developing countries derived increasing shares of value added from participation in GVCs, their participation is becoming more diverse in different regions. UNIDO has provided greater insights into the operations of specific industries, their governance structure, key actors and their relationships. Although greater participation in GVCs is a trend witness across the globe, some countries are benefiting from GVCs more and increasing their share of manufacturing value added in the world. Our sub-sector level work indicates that developing countries can only benefit from GVCs under certain conditions. Foreign direct investments tend to be more conducive to technology transfers within the chain and to spill-overs to firms outside the chain if the investments are made in industries closer to the country's comparative advantages. Institutional proximity between the home and host countries plays a crucial role as well. The higher the similarity between the procedures and rules governing economic transactions are between countries, the easier it becomes for multinational corporations to cope with the host country's environment and they are thus more likely to invest in relationships with local firms. Chain- and firm-specific factors also influence the technological development of participants in GVCs. Certain governance structures, such as captive relationships, are less conducive to technological upgrading, and firms may have a higher chance of upgrading when their efforts within the chains are complemented by their autonomous learning activities outside the chains. For sustained growth and upgrading, firms need to continuously enhance the quality of linkages with foreign firms by going beyond relationships that are strictly governed by prices and specifications.

Research by UNIDO and GVC experts has laid the foundation for the development of UNIDO's diagnostic tools, which are introduced in the next chapter.

4. UNIDO'S EXPERIENCE IN INDUSTRIAL VALUE CHAIN ANALYSIS

Value chain analysis can serve a number of purposes. First, it provides information about the status quo of development in specific value chains. The given status quo can be compared across a number of value chains. Furthermore, value chain analysis can provide information on the specific benefits certain actors engaged in the value chain can or cannot accrue. Finally, the most important contribution of value chain analysis probably is the identification of which parts of the value chain should be considered for development interventions and on how those interventions shall be designed. In Schmitz's words (2005), value chain analysis enables government and development agencies to identify development options, and leverage points to improve the functioning of the chain and the benefits it renders to its actual and potential members.

4.1. UNIDO's approach to value chain analysis

UNIDO has developed tools for value chain analysis drawing from both ongoing research as well as from experiences in its technical cooperation projects. The key elements of UNIDO's approach to value chain analysis are summarized in "Diagnostic for Industrial Value Chain Development: An Integrated Tool" (UNIDO, 2011) and are also reflected in the UNIDO Institute's Online Training Course on "Diagnostics for Industrial Value Chain Development". Additional elements of value chain analysis are included in "Pro-poor value chains: 25 guiding questions for designing and implementing agro-industry projects" (UNIDO, IFAD and DIIS, 2011) as well as in "Training Course on Sectoral and Value Added Chain" (UNIDO, 2012a). UNIDO's approach to value chain analysis is furthermore informed by the 3C (Compete, Conform and Connect) concept the organization uses in its works on trade capacity building and assistance in standards compliance (UNIDO, 2006). Value chain analysis at UNIDO also reflects aspects of cleaner production and energy use.

In general, UNIDO's approach to value chain analysis follows a common logic of value chain scholars worldwide and is compatible, at least in parts, with value chain analytical tools of other development agencies such as GIZ, ILO or USAID. It differs from other approaches with regard to the entry point of analysis, i.e. the manufacturing and processing segment of the value chain, the depth of the analysis and the process of data collection and stakeholder engagement it proposes.

Broadly speaking, UNIDO's approach to value chain analysis focuses on four major outputs:

1. A mapping of the functions, actors, interactions, marketing channels and public and private service providers involved in a given value chain, usually restricted to the borders of a specific country;
2. A structured analysis of the status quo of development in each segment of the value chain (including primary production, 1st to n-level processing and marketing) as well as cross-cutting issues such as governance, finance, environmental sustainability and the business and socio-political context.

- An analysis of the constraints and opportunities the entire value chain encountered, each segment within the chain and each of the crosscutting issues identified above.
- The development of a strategy to implement a value chain support programme including a plan of action to be implemented by governments, development agencies and actors in the value chain.

UNIDO’s approach to value chain analysis is based on four key principles: i) firms in the value chain **add value** to products, ii) actors who want to remain engaged in the value chain need to reach a certain level of **competitiveness**, iii) the analysis of the value chain should be **integrated** in such a way to ensure that major aspects relating to firm- and chain-level competitiveness are covered, and iv) taking into consideration that firms in value chains are subject to **structural change** over time.

Value addition occurs in each segment of the value chain as the value of the product is augmented through different activities, including bulking, processing and transformation, assembly, packaging, transport, branding, retail, etc. When actors in value chains take market positions, they become owners of the product. The difference in the costs of buying and selling the product is the “value added” it generates. The net profits (or profit margins) are determined when the costs of processing and handling operations are deducted from the value added. The value added and profit margins of individual actors in the value chain can be calculated. However, in strategic value chain analysis, it is more common to calculate the average value added and margins per unit of output for entire segments of the value chain. Figure 4.1 illustrates the calculation of value addition, profit margins (net profits) and costs in the case

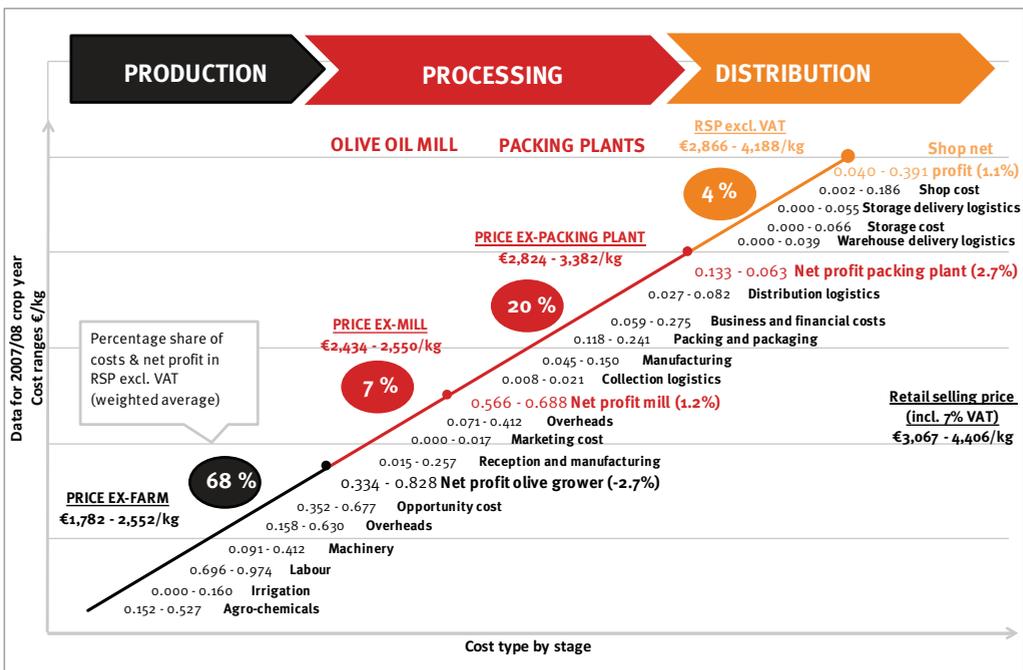
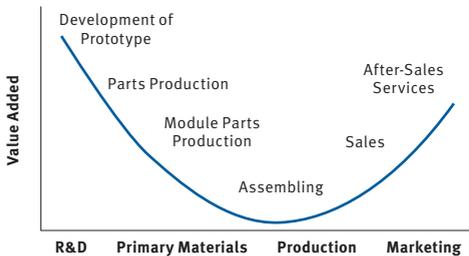


Figure 4.1: Prices, margins and value added in the Spanish extra virgin olive oil value chain
 Source: Own elaboration based on MARM (2010)

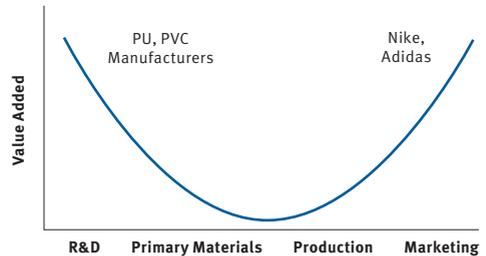
of the Spanish olive oil value chain. The figure reveals, among other things, that olive growers have negative margins (net profits) of 2.7 per cent. Mills, packers and retailers also have low per unit profits, but they also move relatively large quantities of products.

Value addition (and profit margins) can vary across a value chain’s segments, depending on the type of the value chain. Mudambi (2008) stresses that the bulk of value addition in many manufacturing industries does not occur in production, but upstream in the value chain, in research and development activities that lead to new products and improved productivity, as well as downstream in the value chain, in design, branding and marketing activities. Following this argumentation and on the basis of anecdotal evidence, Figure 4.2 schematically presents the relative levels of value addition by segment in four value chains with quite different patterns: shoes, consumer electronics, semiconductors and petrochemicals. Figure 4.2 shows that with the exception of the petrochemical value chain, most value added is created in the marketing and in the after sales service segment of the value chain. In the case of consumer electronics, for example, value added is high in the upstream, which includes the development of operating systems and central processing units, as well as in the downstream, which includes maintenance services. Profitability is lowest in the midstream process, which involves such labour-intensive processes as assembly. The shoe industry’s value chain is similar to that of consumer electronics; the highest value added is found in marketing (see, for example, large brand marketers such as Nike and Adidas). Value added is lower in the production of raw materials, where PU and PVC man-made leather manufacturers are the main actors. The lowest value added is the shoe factory. In the case of semi-conductors, the value added of manufacturing and marketing is about equal, while that of components (primary materials) is relatively lower. Finally, in the petrochemical value chain, the figure resembles an inverted-U, where raw materials and marketing capture relatively less value added.

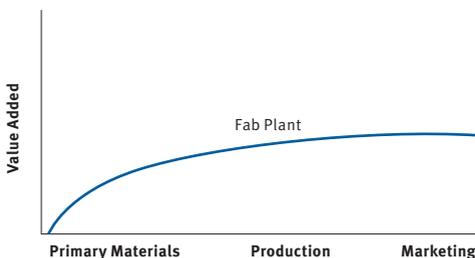
Electronics Value Chain



Shoes Value Chain



Semiconductor Value Chain



Petrochemical Value Chain

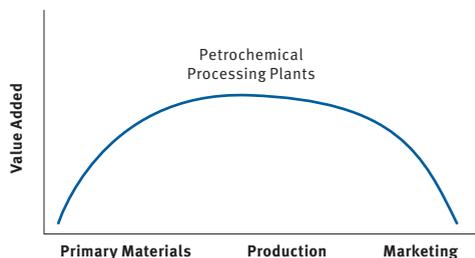


Figure 4.2: Anecdotal evidence of value distribution in selected industries

Source: Own elaboration based on UNIDO (2012a)

Having data on value added and net profits per value chain segment allows for a wide range of strategic considerations. For example, the net profit of different actors in the chain can provide an indication of their relative market power. High profit margins may indicate buyer power while very low or even negative profit margins may imply that the entire value chain is at risk as actors may soon drop out. A rule of thumb in this regard is that the profit margins in each value chain segment should at least be high enough to make the corresponding actor feel positive about her businesses. Estimates on profit margins together with a cost analysis are also helpful for identifying opportunities to reduce costs and increase productivity, e.g. via the use of improved technologies and new knowledge.

By comparing costs and productivity measures among actors within the same segment in the value chain, it is also possible to draw conclusions on the level of **competitiveness** in the value chain. Industrial competitiveness can be defined as the capacity of countries to increase their industrial presence in domestic and international markets while developing industrial structures in sectors and activities with higher value added and technological content (UNIDO, 2003b). This concept can be broken down to the level of sub-sectors, industries, value chains, value chain segments or companies. The analyst can thus compare certain processes of value addition or even the entire chain, and determine whether the efficiency in technology use, knowledge application and organization in the production and transformation processes are significantly lower (entailing higher costs and lower levels of productivity) than those of competitors within the chain, in other countries or in other value chains/industries/sectors. Consequently, a set of measures can be proposed to improve both cost structure and productivity based on benchmarks from competitors. To do so, production data of the local value chain and of foreign competitors for the same product should be compared.

Many value chain analytical tools focus on certain aspects of value chain development. For example, one could identify training needs of manufacturing SMEs or arrange for subsidized laboratory equipment to monitor product quality. Such interventions contribute to value chain development but are partial in nature. UNIDO's approach considers value chains to be complex systems that can only develop if a set of outcomes (induced via interventions or not) occur at the same time. A fruit processing plant would not be profitable, for example, unless it is able to source enough raw fruits and has fixed arrangements with buyers of fruit pulp and fruit juice. Crafting a value chain development support programme that only provides access to subsidized technology for fruit processing is, therefore, "developmental nonsense" if the supply of raw fruit and market arrangements are not in place or are not dealt with by the project itself or in partnership with other development agencies. The same applies to finance arrangements, business and technical skills, as well as capacity to comply with regulations and standards, which all need to be in place for the processing plant to operate successfully. This applies to all actors and processes in the value chain, i.e. the necessary conditions need to be put in place for all of them for successful operation. An **integrated approach to value chain development** means dealing with all development issues on all levels (in all segments) of the value chain. An analysis of value chain development therefore needs to be integrated in nature and take account of all development challenges and opportunities on all levels (in all segments) of the value chain.

Value chain analyses should also take into consideration that **value chains change continually**. As industries evolve, value distribution changes as well, that is, firms and industries come and go. The major structural forces that drive structural change in industrial systems include commoditization, globalization, specialization, technological change and increasing concern

for environmental sustainability. At early stages of development, there are only one or a few producers with the necessary capabilities to deliver the product or service. As time goes by, other firms catch up and cutting-edge, innovative products start being produced by many firms, implying that barriers to entry decrease with time. Changes in industrial systems are also related to industry lifecycles. Therefore, it is important to focus on how value distribution has changed over time and how it is expected to change in the future. Hence, it is essential to understand the value chain's existing and potential production capacity and the types of technologies firms use in production. Moreover, it is also important to evaluate across the value chain, where it may be necessary to distinguish between different steps of transformation (e.g. in the wood processing industry, one can distinguish between primary wood processing at sawmills and secondary processing, such as furniture production).

4.2. Analysing value chains across 7 dimensions

UNIDO's practical approach to analyse integration into value chains focuses on a set of 7 dimensions with 40 analytical parameters (see Table 4.1). Once an initial map is drawn, additional layers of information on specific aspects of the value chain are added to the map following analytical parameters. Value chain analyses that provide information on fewer than the 40 parameters included in the table are partial in nature and fail to meet the integrated dimension of analyses of value chain development described above.

Dimension 0: Mapping	Analytical parameters 0.1 Product 0.2 Actors and their functions 0.3 Flow of product and end-markets 0.4 Business interactions 0.5 Service provision	Dimension 4: Governance of value chains	4.1 Actor domination 4.2 Distribution of value addition 4.3 Cluster concentration 4.4 Type of governance 4.5 Collaboration and partnerships
Dimension 1: Sourcing of inputs and supplies	1.1 Primary product characteristics 1.2 Characteristics of primary producers and input providers 1.3 Contractual arrangements 1.4 Logistics, infrastructure and transport facilities 1.5 Communication	Dimension 5: Sustainable production and energy use	5.1 Use of materials and waste 5.2 Energy use 5.3 Effects on biodiversity 5.4 Emissions and water use 5.5 Environmental standards
Dimension 2: Production capacity and technology	2.1 Production capacity 2.2 Technology 2.3 Knowledge use 2.4 Costs and margins 2.5 Innovation	Dimension 6: Value chain finance	6.1 Financial attractiveness 6.2 Financial risks 6.3 Norms and practices 6.4 Availability of financing 6.5 Finance needs
Dimension 3: End-markets and trade	3.1 End-product characteristics 3.2 Consumer demand 3.3 Marketing and trade capacities 3.4 Marketing value added and marketed production 3.5 Standards	Dimension 7: Business environment and socio- political context	7.1 Business environment 7.2 Product and trade regulations 7.3 Public and private service provision 7.4 Policies 7.5 Social and cultural context

Table 4.1: Diagnostic framework for industrial value chains

Source: Adapted from UNIDO (2011), p. 7

4.2.1. Mapping the value chain

Mapping is an initial step in value chain analysis and provides an overview of the actors and their functions, business interactions and service provision, thus illustrating the way products add value, flowing from raw materials to end-markets, thus indicating how the industry operates. Value chain scholars draw maps in many ways, often randomly, mixing actors, steps in value addition and service provision functions with few or no quantitative data on the actors involved and the amount of products moved through the chain. The result is a figure that resembles a flow diagram with boxes of ill-defined content linked by arrows of unidentified nature.

UNIDO suggests applying a few basic standards to make value chain maps meaningful and comparable. These standards are a) distinction between actors and functions, b) definition of support functions, c) visualization of product flow up to end-markets, and d) quantification of actors and product flow. To meet these standards, analysts can take the following steps:

1. Define the various value addition functions that occur in the value chain, such as input supply, production, assembly, processing, wholesale, export, retail, etc. Separate the functions graphically into segments, e.g. starting with input supply on the left moving to retail on the right.
2. Specify types of actors and allocate them in accordance with different functions. Types of actors rather than individual firms should be used. Some actors can cover more than one function.
3. Enter arrows that represent the flow of products from one actor to the next and include information on the type of contractual arrangements.
4. Specify end-markets and relocate actors and arrows accordingly. Define market channels, with end-markets at the end of the map.
5. Include generic categories of support services: financial services, transport, packaging, etc. Arrows can illustrate which actors benefit from these services. Information identifying the main providers of these services can also be included.
6. Add data overlays when information is available, relevant and helpful for the chain analysis. Overlays can be represented by N = Number of firms or V = Volume of product.
7. Provide a sufficiently detailed narrative explanation of the value chain.

It is not always easy to collect all necessary information to draw such maps. However, an initial figure can be drawn, leaving blanks where information is missing and/or providing estimates (e.g. $10 < N < 100$). Often, additional information is gathered through the collection of data for the other dimensions, meaning that additions and corrections to the value chain map need to be made on the basis of an analysis, and the final map may look much more complete and accurate than the previous one. In any case, the map should be understood as a crude snapshot of the value chain, which leaves many aspects of the value chain open to quantitative and qualitative description in subsequent chapters.

4.2.2. Dimension 1: Sourcing of inputs and supplies

The initial point of value creation is the production of raw materials and primary products that firms in the value chain use as inputs to add value (see discussion on Dimension 2 below). Under Dimension 1, the aim of the analysis is to understand these materials and primary products, the way they are produced, who produces them and how they are sourced. The main parameters of the analysis include:

- **Primary product characteristics:** The objective is to describe the most important primary products and inputs used in the value chain. This should involve the categorization of materials according to product category (e.g. according to the International Standard Industrial Classification), the degree of sophistication to produce these products, a description of their perishability, bulkiness and the required handling, among others. Further, the different types and qualities of the products and a quantification of the volumes being purchased sourced both domestically and from international markets should be examined. The analysis can be concluded with a reflection on options to substitute the products with others.
- **Characteristics of primary producers and input providers:** The analyst should characterize the main primary producers and input providers in the value chain. This includes an estimation of their number domestically and globally, a description of their profile and product portfolio, their professionalism and their attitude towards business. Another piece of useful information is the competition on the supplies market and the overall level of development of the supply industry. All this contextual information should be complemented with information on value addition and net profit calculation (as suggested in section 4.1) for typical suppliers as averages for the chain or for certain categories of suppliers.
- **Contractual arrangements:** The focus lies on understanding the nature of the contractual relationships between manufacturers and suppliers and the degree to which these facilitate the flow of products through the chain. The contract can be arms-length based on a one-time handshake or can include a long-term complicated relationship between buyers, including advance payment, credit, advisory service provision and obligations of supply in quantity and quality. Useful questions include duration of agreement, delivery and payment conditions, quality control measures, degree of contract formalization, opportunities for the enforcement of contractual obligations, non-financial and financial services provided, existence of subcontracting and scope for change.
- **Logistics:** This entails a description of how inputs and supplies are delivered to the place of manufacturing. It includes an assessment of organizational and physical transactions involved in procuring inputs and supplies, including the average number of suppliers, lead time (the gaps between actual and optimal time), frequency of delayed delivery, administrative procedures required, frequency of transactions, transportation costs (absolute and relative to product value), quantity of inputs to be transported and value of loss (absolute and as a share of delivery value). Another important piece of information is available infrastructure to transport inputs and supplies as well as an overview of existing transport providers. An analysis of existing constraints, such as road lengths, number of airports, cost per mile/km for different means and modes of transport, trucking charges (\$/km tonne), shipment inspections and bureaucratic hurdles is also valuable.

- **Communication:** Production without efficient communication with suppliers is likely to result in supply shortfalls and higher costs for procurement. Therefore, it is important to understand the nature of communication between buyers and suppliers and the degree to which it enables trust and stable business relationships. The frequency of personal contacts, trust among contractual partners, loyalty in contractual relationships, transparency in communication and the frequency of personal contacts should be analysed as well.

Ultimately, the analyst should generate a list of major constraints in the value chain as regards the sourcing of inputs and supplies and explore the potentials of removing these constraints through policy measures and joint actions among value chain actors. This could, for example, include the development of better contractual relationships between buyers and suppliers, increased efforts by buyers to pass on knowledge and know-how and occasionally technology that suppliers can use not only to comply with the buyers' quality criteria, but also to improve their productivity and profits, and investments in better logistics and management of supplier relationships.

4.2.3. Dimension 2: Production capacity and technology

Production is the core segment of the value chain from an industrial/manufacturing development perspective; it refers to the processing, reassembling and manufacturing of primary products and products with a lesser degree of value addition. The analysis of this segment of the industrial value chain covers the most essential part of overall value chain diagnostics. Emphasis lies on understanding the firms', industry's or country's capabilities to manufacture and transform goods, including the means of production (machinery), human capital and the knowledge and technologies used in production. Useful parameters to focus on are, among others:

- **Production capacity:** The analyst shall describe production capacity with regard to the size of production plants, factories and processing units, the number of employees and the quantity of output produced by different segments of the chain (per annum). If sufficient data can be collected, existing production should be compared with installed capacity deriving a ratio of capacity utilization (relation of actual output to maximum amount of output that can be produced). It is also useful to categorize the firms and different types and qualities of products they produce. Indirect evidence on production capacity can also be gathered from capital investment inventories, investments in new machinery and technology or cost reduction and productivity increases realized.
- **Technology:** Production processes depend on the technology used, which might be technology-intensive drawing from sophisticated machinery, equipment and know-how or use basic production methods relying on labour input rather than capital investment. Useful indicators for a description of technologies include, among others, the nature of technology, its level of sophistication, its source, its reliability and its interchangeability. The analyst needs to describe the technologies used in the value chain with regard to such parameters and evaluate their appropriateness, throughput, productivity (output per unit of land/labour/capital), reliability, affordability, suitability and accessibility. Once the analyst has established local technology use, a comparison with peers in the form of benchmarking

studies can be conducted. Here, it is useful to collect international statistics, for example, from UNIDO's World Productivity Database, that allow comparison of technical productivity parameters.

- **Knowledge use:** The use of technology goes hand-in-hand with production know-how; often, it is actually the knowledge of how to correctly use the technology that renders it particularly efficient and provides the competitive edge. The analyst should therefore describe the knowledge being applied in the various steps of production and evaluate the extent to which it is present among the various workers, technicians and production managers of firms in the chain. This should also include a reflection on the variance of knowledge being used in the chain, from the most basic to the most advanced knowledge being used and the share of foreign and/or imported knowledge in relation to available local knowledge. It is also useful to analyse the means of knowledge exchange, diffusion and learning commonly being used.
- **Costs and margins:** Technology and knowledge used, together with other production factors, determine overall costs of production (see also section 4.1). The analyst must collect sufficient quantitative data to determine the approximate average costs (indirect and direct) of production in the various segments of the value chain and, by combining estimations of incomes from sales, calculate the average net benefits and profit margins in each of the segments of the value chain. Such indicators should then be compared with those of competing and best-practice firms within the country and abroad based on specific benchmarking studies. Comparisons by calculating costs and margins using indicators derived from UN COMTRADE can also be carried out.
- **Innovation:** The objective is to gain an understanding of the readiness of firms in the chain to innovate and the potential needs for innovation that exist for firms to stay competitive as other players, domestically and abroad, move onwards in value chains prone to structural change over time. Innovations can be brought to firms in the form of disembodied knowledge, like in the course of a joint venture and technology spillovers, or even in more physical terms via a new machine that may have a lot of innovative features that allow for more productive use. To obtain this information, the analyst should ask questions about major innovations that were recently developed and/or adopted, current standards prevalent in the market and in research and development facilities, the existence of better technology and the costs of introducing a new technology. Furthermore, it may be important to classify how important innovation is in relation to other strategies of development in the value chain.

Ultimately, the analysis should provide an overview of the main bottlenecks to development in the value chain related to production capacity and technology and provide some options on where potential development efforts should be focused. This can include skills development, technology transfer, the introduction of pilot production units and incubators, the creation of knowledge exchange and joint learning platforms, e.g. within industrial clusters. Many of such value chain development measures in the area of production capacity and technology can be considered “upgrading” strategies (see Section 3.3.4).

4.2.4. Dimension 3: End-markets and trade

Value chain products are ultimately sold to end consumers. For the analyst, it is important to understand the markets on which value chain products are sold and the mechanisms via which this occurs. Market demand depends on the type of end product, consumer preferences with regard to quality, image and other product characteristics, as well as consumers' purchasing power. Useful parameters in this dimension include the following:

- **End-product characteristics:** The objective is to describe and categorize end products and product lines in the value chain. Product value, degree of transformation, technological sophistication, user friendliness and product duration and perishability are all good dimensions to characterize end products.
- **Consumer demand:** The analyst should specify the nature of consumer demand and inquire whether existing products correspond to existing and future demands. This includes, among others, investigating the consumer segments the value chain caters to, the quantity of products sold to certain types of consumers (including change over time), market share and market growth rates of products in the chain, purchasing power in the various consumer segments and the needs and preferences in the different consumer segments. Another way to determine consumer demands is to investigate end-buyer perspectives, particularly when comprehensive consumer surveys cannot be carried out in more rapid types of value chain analyses. This involves identifying important end-buyers in the chain and surveying their perception on consumer demands, the chain's capacity to respond to such demands as well as perceptions on new trends and product development and on existing capacities, skills and product quality.
- **Marketing capacities:** Producers, branders, retailers and traders in a value chain have certain capacities to market their products. The aim is to identify marketing capacities by investigating existing marketing practices and strategies, number and type of marketing agents, skills of marketing staff, marketing budget estimates, etc. This can be complemented with a comparison of other countries' marketing capacities and value chains. The strength of brands, image and reputation of certain products are also an aspect to be considered here.
- **Marketing value added and marketed production:** The focus here is on evaluating the profit margin in the marketing segment of the value chain. The scope of marketing value added depends on the importance of branding, retail and marketing strategy functions associated with the end product. Luxury items tend to have a higher value added in marketing than simple commodity products. For the calculation of the marketing value added, the average selling price of the readily manufactured good is deducted from the average end consumer price. Calculating the profit margin requires an estimation of the branding, retailing, logistical and other costs associated with the marketing of the product. As details on these costs are usually difficult to obtain, it is best to apply a rough percentage to calculate the net profit. Furthermore, the analyst should provide quantitative information on the products being marketed domestically and internationally. This helps to dimension the scope of existing demand, market saturation and potentials for sales. Data on imported and exported data of manufactured goods can be derived from UN COMTRADE¹³. For data on products sold on the domestic market, national statistics need to be considered, which are sometimes more difficult to obtain. Once domestic

¹³ Available at <http://comtrade.un.org/>

production is established, the analyst can also compare the market shares of a country and region with those of other producer countries, particularly other leading producers. UNIDO's approach in this regard typically makes use of specific indicators for market share analyses. These indicators provide important information on the competitiveness of domestic exports and potential attractive markets at the global level (see Box 4.1).

Box 4.1. Market share analysis

The main focus of a market share analysis is to identify main exporter or importer regions and countries. For this purpose, UNIDO has designed the Import Dependence Index (IDI) and the Export Competitiveness Index (ECI) (UNIDO, 2012).

The IDI index combines the following two indicators:

Trade balance: refers to the difference between the value of exports and imports of each product. The more negative this difference, the higher the dependence level of the importing country.

World market share: refers to the ratio between a country's imports of a specific product and total world imports of that product. This impact indicator displays the share of each country in world imports of the given product.

Combining both indicators, a country is considered to have an attractive market if: a) it has a negative trade balance in the last year of analysis; and b) the percentage of country imports in total world imports of a given product is above the world average.

The IDI can be calculated on the basis of countries that meet the two requirements and classify the markets in accordance with dependency level. The first step is to standardize the two indicators for the selected countries using the following formula:

$$S_{c,p} = \frac{(X_{c,p} - \min(X_{c,p}))}{\max(X_{c,p}) - \min(X_{c,p})}$$

where S stands for the standardized value of each dependency indicator (trade balance and world market share) in country c for a specific product p , X denotes the actual value of each indicator and $\min(X)$ and $\max(X)$ are the minimum and maximum values of each indicator for product p across all countries.

The standardized values range between 0 (low dependency) and 1 (high dependency). The final index is obtained by applying the arithmetic average of the two standardized indicators.

The Export Competitiveness Index (ECI) measures a country's relative export competitiveness for a specific product of the value chain. It is calculated similarly to the IDI using two indicators:

Exports per capita: refers to the exports of one specific product divided by the country's total population. It indicates the country's export capacity, taking its size into account. A higher value of the indicator represents a higher export orientation of the country and its capacity to compete in the world market.

Share in world market: refers to the ratio between the exports of one specific product and world exports of that product. A higher value of the indicator shows higher export orientation of the country and its capacity to compete in the world market. A higher country share in the world market means that the country has a higher influence on price oscillation and the traded volume.

The ECI is then computed following the same procedure as with the IDI. Both indicators are standardized and the ECI is then calculated as the arithmetic average of the standardized indicators.

Source: UNIDO, 2012a

- **Standards:** Standards are means to define and regulate the main characteristics of products and how they are produced. They can be mandatory (in accordance with national laws and international conventions) or voluntary (on the basis of an agreement between buyers and suppliers) (UNIDO, 2006). Standards can act as barriers to entry, preventing developing country producers from entering markets and selling their products. Standards can contribute to development goals not only by ensuring market access, but also through compliance with certain codes of conduct in production related to decent work, environmental protection or social sustainability. The analyst should describe the use of standards in the value chain (number of producers, volume of production), the costs of standards compliance that accrue for those who comply (costs of introduction and costs of maintaining compliance), and determine producers' capacity to comply with local and international standards. Further, whether service providers exist with sufficient capacity to help firms implement standards compliance programmes needs to be analysed as well. The status of certification and metrology institutions and their capacity to apply standards compliance systems should be examined. Finally, the overall policy framework needs to be analysed to determine whether it is adequately designed and implemented to ensure standards compliance through domestic firms.

Finally, the analyst should possess a catalogue of the major constraints and challenges in the marketing and trade of the value chain's products and develop a set of solutions to remove relevant bottlenecks and target existing market opportunities.

4.2.5. Dimension 4: Governance of value chains

Analysing the activities of suppliers, producers and buyers (Dimensions 1 to 3) alone does not cover the complex interdependencies between actors in the value chain; therefore, it is also fundamental to look at the chain's governance structure. As stated in Chapter 3, chain governance refers to the rules and influence under which the actors in the value chain interact. Chain governance relates to the coordination function within a value chain, particularly how and by whom it is performed. Coordination among actors in the value chain can be voluntary or is attained through vertical integration by firms that engage in various functions of the value chain. In today's globalized markets where collective and systemic competitiveness is becoming increasingly important, chain coordination allows agents to reduce costs and risks in production, transport and storage, and permits timely production in response to buyer and consumer demands. Chain governance ensures that interactions between firms along a value chain are more than simply random, it allows for the establishment of efficient producer/supplier and buyer relationships with low transaction costs and increased liability. Management of value chain relationships can be exercised by private lead companies and/or the government but are often decentralized or even ad-hoc and chaotic. The focus of the diagnostics on chain governance is on the rules and regulations that determine the functioning of a value chain, its coordination, existing barriers to entry and the dominance of certain agents such as buyers, suppliers or trade agents. The main parameters for analysing value chain governance include:

- **Actor domination:** The focus is on identifying lead firms in the selected value chain that exercise a specific type of market power over other value chain actors. The analyst can investigate this aspect by asking questions on the size and market share of the main firms in the value chain, the core competences that lie in the hands of some firms and the linkages

between the main firms and suppliers. The indicators for the existence of dominant positions in a value chain are market shares, price dictation, the power to make others comply with certain standards (possibly at their own costs) and the share of value addition that certain actors are able to accrue. Actor domination can also lead to abuse by certain chain agents; if monopolistic structures allow for it, certain buyers or sellers in the chain could try to push for win-lose relationships, which would increase their benefits but harm the overall functioning and competitiveness of the chain. Lead firms can range from global producers that source inputs from suppliers around the globe to retailers and branded marketers or manufacturers that do not produce goods, but who act as coordinators of the chain at different locations scattered around the world. Various types of manufacturers—and contractual relationships—can be identified, including the following¹⁴: original equipment assemblers (firms that assemble under a contract with a global buyer), original equipment manufacturers (firms that manufacture a product that bears the buyer's brand), own design manufacturers (firms that design and manufacture a product that bears the buyer's brand) and own brand manufacturers (firms that design and manufacture a product that bears their own brand).

- **Distribution of value added:** Dimensions 1 to 3 investigate the value added in each segment of the value chain. Here, the analyst should synthesize those pieces of information and conduct a comparison of the value added and the net profits in each segment of the value chain (graphic comparison in a figure such as Figure 4.1 is particularly useful). When comparing the net profits, the analyst also needs to take the average size of the operation into account (small margins, but large quantities of products may be an indication for market dominance). The value added and net profit that certain actors in the national part of the value chain are able to accrue in relation to actors in other countries or in other value chains can also be compared.
- **Cluster concentration:** Clusters are patterns of industrial organization. The term usually refers to the accumulation of a set of firms located in a denominated geographic location that share characteristics of product technology or product portfolio. Clusters are often home to an extensive exchange of information and technology while their members profit from a common pool of resources, skilled workers and support services. Clusters are typical in the primary production and supplier segments of the value chain. However, it is important to note that there are value chains that are not part of any cluster because only few firms participate in it or because the firms are more vertically integrated so that collective action among producers of the same type does not occur. In any case, the analyst should determine the existence of any cluster-based organizational pattern in the value chain. This would require identification of the number of geographically concentrated firms in a segment of the value chain, the interactions between those firms and their stage of development (use of technology, type of products they manufacture). When identified, the nature of the cluster should be described, outlining whether collective action occurs in the (joint) procurement of supplies, joint learning and innovation development and/or joint marketing.
- **Type of governance:** Finally, the analyst can further define the type of governance that seems to be dominant in the value chain using the categories proposed by scholars (see Section 3.3.3). This would require a determination of market dependence, sales concentration, knowledge asymmetry, price setting ability and product/service specificity.

¹⁴ In recent decades, some Asian manufacturers moved from OEMs to ODMs and, finally, to OBM.

As detailed above, a major distinction can be drawn between market and hierarchy: firms either buy goods and services from other firms on the market or acquire capacities through mergers and take-overs, leading to a hierarchical integration of activities. Some guidelines to determine the existence and/or nature of hierarchical linkages within the value chain involves looking at market dependency (above 40 per cent of sales to one market indicates hierarchical linkages), sales concentration (above 30 per cent of sales to one buyer indicates quasi-hierarchical linkages), knowledge asymmetry (most knowledge on production, design, marketing and branding concentrated in one buyer and/or value chain segment indicates quasi-hierarchical linkages) and product specificity (the more specific the product, the more hierarchical the linkages are) (Humphrey and Schmitz, 2000; Gereffi et al., 2005; Bazan and Navas-Alemán, 2004).

- **Collaboration and partnerships:** The level of collaboration in a value chain can be analysed by means of a transaction costs analysis or other approaches that focus on strategic business development and partnering. Best practice in this type of analysis makes use of an integrated set of measures that describe the performance and evolution of collaborative arrangements and partnerships over time. This includes, for example, analysing how partnerships distribute benefits among partners and how they generate synergy in learning and technology development, the relationship between costs and benefits and the evolution of the partnership arrangements over time. More complex interactions beyond a small number of core actors in the value chain can be analysed by means of a Social Network Analysis (SNA) (Rowley, Behrens and Krackhardt, 2000; Cantner and Graf, 2006; Hartwich et al., 2007).

Ultimately, the analyst obtains an overview of the main constraints to development related to governance, asymmetric power relationships and lack of coordination in the chain and can develop a set of recommendations to remove them, leading to an improved model of chain governance that allows the development of systemic competitiveness.

4.2.6. Dimension 5: Sustainable production and energy use

Rising levels of income are closely reflected by corresponding levels of resource extraction and environmental degradation. Global resource use has increased eightfold over the course of the 20th century and as the number of middle-class consumers increases by 3 billion over the next 20 years, demand for resources will further rise exponentially. It is estimated that by 2030, the world will need at least 50 per cent more food, 45 per cent more energy and 30 per cent more water. If we continue with ‘business as usual’, global material consumption will nearly triple by 2050 relative to 2010 values to 140 billion tonnes annually. Additionally, critical industrial resources, such as rare earth elements, are already in ever shorter supply. As both population and income levels rise, damaging patterns of production and consumption that are already testing planetary boundaries are only amplified. Following this trend, by 2050, we would require the equivalent of the resources provided by two and half planets to maintain current consumption levels (UNEP, 2011).

Despite growing recognition of these issues and risks, resource usage, pollution and degradation of the environment have continued to increase in absolute terms. Projections indicate that global industrial production will increase by a factor of four between now and 2050. It therefore

appears that unrestrained industrial growth remains the goal in many countries, and resource use, pollution and environmental degradation are only set to increase even further.

The field of environmental management has developed an extensive catalogue of tools and methods for environmental assessment, including the ecological footprint, bottom-up analysis tools like Life Cycle Assessments (LCA) or top-down approaches like a Material and Energy Flow Analysis (MEFA) and material stock accounting. MRIO models with data on CO₂ emissions or material usage (e.g. Wiedmann et al., 2013) allow a critical review of the common resource efficiency indicators which are usually defined as gross domestic product divided by domestic material consumption (DMC).¹⁵

Building on some of these approaches and tools to carry out a rapid diagnostic of environmental issues in the value chain, the aim of this dimension is to look at the effects the value chain and its development can have on the sustainable use of natural and other resources. It thus lies at the core of inclusive and sustainable industrial development. Under this dimension, the analyst should check whether certain aspects along the chain can be considered “hotspots” in sustainable production, meaning critical areas of unsustainable or over-use of resources. Resource use can potentially be harmful and usually also has a negative influence on firms’ cost structure. Resource efficiency measures can also be measures to reduce the costs of production in the medium and long term. Business opportunities may also arise from engagement in newly emerging value chains in the bio-energy, bio-economy and green growth industries. Finally, the analyst should also be able to give recommendations on how the use of resources can be improved to become more sustainable. Useful parameters in this regard are:

- **Use of materials and waste:** The analyst should provide information on what materials are being used to produce products in the value chain and to what extent the production and use of materials is harmful to the environment. Indicators include consumption of the most important raw materials such as wood, plastic, fibres and primary agricultural produce, efficiency parameters of material use, chemicals and toxins used and material-saving measures in place. Further information should be provided on how the leftovers of the production process are disposed, for example, whether there is a great deal of waste produced in the various segments of the value chain and how the waste is treated and/or reused. This includes the description of waste management practices.
- **Energy use:** Value chains need reliable and affordable sources of energy if they are to be competitive. Here, the focus of the analysis should be on how much and what type of energy (electricity, fossil fuels, wood, charcoal, etc.) is used in the various stages of production. Further, it is important to evaluate the efficiency with which the energy is used, whether there is wastage and whether any energy-saving measures are in place. Emphasis should also be put on the use of alternative technologies. Ultimately, the analysis should look at the chain’s energy needs and balance them against the adverse effects of energy use such

¹⁵ However, the scope of DMC is limited to the amount of materials directly used by an economy (raw materials extracted from the domestic territory, plus all physical imports minus all physical exports). It does not include upstream raw materials related to imports and exports originating from outside the focal economy. Another approach has thus been put forward: The “Material Footprint” (MF) indicator is defined as the global allocation of used raw material extraction to the final demand of an economy. In contrast to indicators of standard economy-wide material flow accounting, which are based on apparent physical consumption, the MF does not record the actual physical movement of materials within and among countries, but instead enumerates the link between the beginning of a production chain (where raw materials are extracted from the natural environment) and its end, meaning where a product or service is consumed (Wiedmann et al., 2013). This implied a shift from a production-based viewpoint to a consumption-based one, and provides a much more accurate picture of where resources are demanded and thus exploited.

as climate change and contamination. Information on energy use can be derived from energy benchmarking and energy audits if such are available. Companies with energy management certification (ISO 50 001 standards were introduced in early 2011) will be able to provide more substantial information on energy use. In the diagnostic, the analyst should also consider volatile energy prices and disruptive and unreliable energy service provision that commonly occurs in developing countries, challenging the business operations of firms.

- **Effects on biodiversity:** Particularly for the production of primary agricultural produce, but also in the exploitation of minerals and ores, stark interferences with the environment occur. Consequently, the resulting land use system may have less ecological value and lower biodiversity. The analyst should therefore ask to what extent (if at all) the sourcing of primary products and contamination with substances due to production harm biodiversity. A description of the existing and projected impacts on biodiversity is useful in this sense.
- **Emissions and contamination:** The issue here is the extent to which emissions in industrial processes contaminate the environment. Useful indicators the analyst can use comprise, for example, air pollutants emitted and emission reduction measures in place. The challenge is to focus on all possible pollutants emitted in the various segments of the value chain to be able to make an estimate on the volumes emitted. The analyst should also investigate how much water the various actors in the value chain use and whether any water-saving measures are in place. Indicators here include, among others, water consumption, water sources, efficiency of water use, water-saving measures in place and treatment of polluted water.
- **Environmental standards:** Increasingly, national legislation bodies and international standards require value chain actors ranging from local producers to global retailers and wholesalers to comply with standards of environmentally friendly production. Modern consumers are showing increased awareness of environmental and social processes as they become more and more concerned about the origin of the products and the way they are transformed. Environmental standards have become increasingly important in more developed countries, often constituting barriers to entry for many small- and medium-sized enterprises from developing countries. It is therefore important for the analyst to describe which environmental standards are currently being applied by the actors in the value chain and which standards will most likely have to be complied with in the future. Further, the analyst should also determine whether environmental performance systems are in place.

Ultimately, the analyst obtains an overview of the amount of resources and energy used in the different segments of the value chain, specifying the common energy and resource sources, ascertaining their efficiency and identifying opportunities to save energy and use alternative technology. The analyst should also keep in mind that any value chain could increase its use of materials, energy and water. Therefore, in the diagnostic, possible negative effects of a further development of the chain should be considered, but also the existing opportunities to develop the value chain towards more sustainable production and energy use.

4.2.7. Dimension 6: Value chain finance

Any business operation requires finance for working capital, capital investment and other needs. In developing countries, financing businesses is particularly difficult as finance

institutions are not used to finance businesses but rather give out loans against collateral such as land and building property located in main cities (but not in rural areas). Further, only few finance institutions exist and credits are usually expensive with high interest rates. Therefore, business owners in developing countries often rely on informal routes (via friends, family or ethnic networks), self-finance or, if they are well-established and of a large size, source finance from abroad.

This dimension provides an overview of the finance situation of businesses in the various segments of the value chain. Further, value chain-specific finance mechanisms may emerge and should be described. For example, buyers can provide finance via advanced payment and the provision of production inputs and machinery, or suppliers can pre-finance the production of inputs and be paid by the buyer after 3 months and/or when the final product is sold. Another possibility is for a bank to finance a manufacturer as well as its input providers; the manufacturer who maintains close business ties with suppliers receives finance from the bank and channels it to the suppliers. Sometimes, government institutions provide guarantees to banks financing “risky” businesses in the value chain, such as informal and small- to medium-sized enterprises. Banks can also accompany the process of value addition, providing and transferring credit lines as the product passes from one producer to the next (in this case, the product serves as collateral).

The goal of the value chain diagnostic should be to understand how the various actors in the value chain finance their operations, the appropriateness and sufficiency of available financing products and how to increase the effectiveness of access to such financial products. Guaranteeing timely access to adequate finance for all businesses in the chain is key to value chain development.

- **Financial attractiveness:** The analyst should try to get a rough idea about how attractive it is for investors and financial institutions to lend to or invest in businesses in the value chain. The main indicators include the net present value and the internal rate of return of businesses in the various segments of the chain, and/or the qualitative judgments on the value chain’s financial attractiveness by main investors. A valuation method that uses projections of future cash flows generated by an investment is the discounted cash flow analysis, which discounts at a given rate to derive a present value for the investment. The sum of the stream of discounted cash flows is called the net present value (NPV) of an investment. If the NPV is greater than the cost of the investment and if this rate of return is higher than those of any other alternative investments, then the investment should be undertaken. Another basic concept of an investment decision is the internal rate of return (IRR), which sets the discount rate to such a level that the NPV of a given investment is equal to zero, and indicates the rate of return an investment is expected to generate¹⁶. In general, projects that have a positive and higher IRR than their cost of capital should be considered for investment.
- **Financial risks:** Further, the analyst should provide basic information on perceptions about risks that investors should take into consideration in financial analyses. Such an analysis should include different kinds of risks, such as supply risks, production risks (machine breaks, accidents, etc.), sales and market risks (price volatility, change in consumer demand,

¹⁶ UNIDO has developed a convenient software called COMFAR (Computer Model for Feasibility Analysis and Reporting) that is especially suited to identify the typical investment patterns and payment streams in industrial projects in developing countries. Among other measures, COMFAR yields plausible rates of returns for the different businesses in the value chain.

etc.), management risks (poor or bad management) and other risks (changes in the political and legal environments).

- **Financing norms and practices:** It is important to understand the economic and social conditions that enable and constrain access to finance. For example, lending within certain ethnic groups/minorities may follow different patterns than in other contexts and entail advantages and/or disadvantages for the members of the group. In developing countries, certain well-connected people with political influence may, at times, have preferential access to finance institutions and get finance at special conditions. In order to understand such financing practices, the analyst may want to make inquiries into common business/ banking practices as well as into social norms and customs. Interviews with entrepreneurs as well as bankers may be useful for this purpose.
- **Availability of finance:** This entails an overview of existing funding sources and current funding practice in the value chain. This includes gathering information on formal credits, informal finance and value chain finance. A distinction must be made between credits provided by formal financial institutions, such as banks and microcredit agencies, and informal financing through loans (moneylenders or friends and family, or when formal actors involved in part of the value chain provide finance as an ancillary service) and advanced or delayed payments in buyer-supplier relationships. The existence of triangular relationships between buyers, suppliers and financial institutions may be an indicator for advanced finance mechanisms.
- **Financing needs:** The analysis here should focus on the needs of each business in the value chain for short term, medium term and long-term finance to arrive at an overall evaluation of the finance needed in the value chain. Comparing the financial needs with the actual finance available leads to the identification of financial gaps that can constitute important bottlenecks in the development of the value chain.

The analyst should bear in mind that a detailed financial analysis is the task of banks and investors. This part of UNIDO's value chain diagnostic is only supposed to provide basic information about the financial situation of businesses in the value chain, ultimately leading to the identification of constraints to the development of the chain and the formulation of policy and programme actions that can remove these financial constraints.

4.2.8. Dimension 7: Business environment and socio-political context

The objective of the analysis is to understand how given policies and institutions constrain businesses in the value chain and what public institutions can do to support the development of the value chain. It also examines trade regimes and regulations for importing inputs and exporting products, the availability of public and private support services and the business culture of public and private actors.

The factors that affect businesses in the value chain include conditions of public policy, norms and customs, laws, regulations and administrative procedures, market institutions, trade regulations, infrastructure and public services. Actors in the value chain and stakeholders in value chain development typically have limited means to alter these conditions. However,

awareness of the business environment and socio-political conditions is crucial for businesses. The goal should be to provide an overview of the business environment and the socio-political framework conditions in the respective country and to reflect how these may affect the situation in the given value chain. The most useful parameters to evaluate the business environment and socio-political context include the following:

- **Business environment:** The question is how difficult it is to set up and run businesses in the value chain. The legal, regulatory and administrative requirements, which directly affect businesses in the value chain, should be specified by surveying firms and business leaders. It may also be helpful to make use of indicators that describe “the ease of doing business” and further complement it with information on existing legal regulatory and administrative requirements to do business in the value chain (accreditation, license, permits, etc.). Information about the business environment is mostly available in the form of business climate comparison indicators. For example, the World Bank’s “Ease of Doing Business Index” measures legal and regulatory requirements directly affecting businesses. Another useful indicator is the World Economic Forum’s “Competitiveness Index”. However, as these indices are only available on aggregated levels, a comparison between countries can be carried out. Such information needs to be complemented with information from national statistics, such as private sector contribution to the economy or level of foreign direct investment, and with personal interviews with firms. However, the analyst must bear in mind that the task is not to describe the country’s business environment at large, but the environment for business making in the given value chain. Most of this information is not readily available from statistics but must be obtained from value chain actors.
- **Product and trade regulations:** The analyst should evaluate which production and trade regulations exist in the value chain and how they affect businesses in the chain. Another important issue is trade regulations. Here, it is necessary to distinguish between regulations in and outside the country. In terms of GVCs, of course, international trade regulations are of particular interest. In order to conduct an analysis, it may be important to examine common trade agreements under the World Trade Organization, the Lomé Convention or regional bodies such as NAFTA, ASEAN or the EU. Stakeholders in the chain, whether representatives of firms or business promotion agencies, usually have sufficient information at hand that can be used for an initial diagnostics. Other indicators for this parameter include, e.g. restrictions on sales and exports, duties and levies to be paid, administrative requirements in trade (accreditation, license, permits, etc.), quality requirements and process requirement (safety, social and environmental standards). Information on regulations and trends are occasionally available from commodity associations and other sources. For example, in the area of leather and leather products, UNIDO manages an online tool¹⁷ with information on future trends, best practice, R&D and trade regulations, among others.
- **Public and private service provision:** The objective is to draw a picture of existing services available to value chain actors and to evaluate whether these are adequate and sufficient. It is recommended to look at indicators related to the availability and quality of services in the field of construction, transportation, road, rail and port infrastructure, electricity and water, business consulting and accounting services, market information services, grading and standard

17 www.leatherpanel.org

regulating bodies, research and laboratory services, education and training and knowledge providers. The existence of specialized research centres and universities that support R&D in the value chain may require particular attention and interviews with leading researchers. For the diagnostics, the analyst should develop a description of the existing capacities in all of the above services. Interviews with main service providers may be useful here.

- **Policies:** Certain policies and programmes that support actors in the value chain and shape the conditions of business making may be in place. The analyst must highlight these policies and explain how they influence the functioning of the value chain, providing information of how effective they are and how they can be improved to become more effective.
- **Social and cultural context:** It is important to understand the causes of behaviour, business culture and social norms by inquiring into the existence, size and influence of social groups engaged in businesses, institutions of trust and the rationale behind contractual relationships. Social norms may be influenced or determined by gender, race, ethnicity, tribe, region, class, religion, etc. They can be powerful determinants in the decisions of individuals with respect to what they want to achieve, with whom they do business, with whom they collaborate and whom they trust. As it is difficult to find objective and quantitative data on social and cultural norms, the diagnostic will most likely need to focus on qualitative data and interpretations. Information is best gathered from interviews with not only business owners, but also focus groups in the value chain.

Ultimately, the analyst should obtain a set of constraints in the areas of business environment and socio-political context, and reflect on the measures that enable value chain actors to better deal with these conditions (and eventually find ways around them). Further, the analyst can highlight areas where decision makers can influence policymakers and reshape existing conditions and policies.

4.3. The process of value chain analysis

Any value chain analysis has to be conducted by experts with inside knowledge on the production and markets in the value chain. At best, a team of experts should become engaged with expertise in (at least) the fields of primary production, manufacturing, markets, environmental issues and finance. The scope and depth of the analysis depends on the money and resources that can be made available to the experts to collect empirical data on the various parameters of the analysis. As funding is usually scarce, the authorities commissioning value chain analyses may tend to skip certain expertise and economize on the collection of primary data. However, UNIDO believes that a sufficiently coherent value chain analysis should not lose its integrated character. As a rule of the thumb, therefore, all of the above parameters should be dealt with in the diagnostic, at least in a qualitative way.

However, engaging national and international experts may not be good enough. Value chain analyses should be grounded in a comprehensive understanding of those who commission it, those who are subject to it (the value chain actors) and those who use it to develop value chain development support programmes from it. This requires the engagement of such stakeholders at various levels. Such an engagement can occur on different levels, including:

- The decision to conduct a value chain analysis
- The design of the value chain analysis
- The mapping of actors, functions and product flows in the chain
- A detailed analysis of the various dimensions of the value chain
- The validation of the value chain analysis
- The development of projects and activities for value chain development support
- The validation of value chain development support programmes
- The cyclical evaluation of the progress of value chain development support.

Certain tools and guidelines for value chain analyses provide comprehensive and sometimes relatively rigid guidance on how to manage stakeholder participation in value chain analysis. Indeed, it is often essential that the entire analysis process is driven by the various stakeholders (and not by governments and development agencies alone) to ensure buy-in and participation in value chain development support activities that are to follow the analysis. However, UNIDO's approach to stakeholder engagement is that this should be dealt with flexibility by those who commission and conduct value chain analyses based on the analysis' objectives, local conditions, local capacities, available time and resources and quality of the required analysis. Certainly, due to the holistic, generic and rapid pace of its approach to value chain analysis, UNIDO envisages the engagement of government entities, the development community and the private sector in the value chain by joining forces in the analysis and cooperating in the development of value chains.

4.4. Using diagnostic results

The results from value chain analyses can be used to better understand the functioning of the chain. However, in most cases, value chain analysis is geared towards designing interventions to remove bottlenecks in chain development and foster certain goals (see Chapter 2). For the latter case, value chain analysts would be required to provide solutions for value chain development. Therefore, a certain degree of creativity would be required to turn the diagnosis into concrete actions that can overcome the identified problems using the existing opportunities. UNIDO suggests that the information gathered for each of the suggested parameters of the seven dimensions above should lead to three types of analyses:

- **Interpretation of the current situation:** This should be based on the status of value chain development in absolute terms and in relation to competing value chains. It is possible to apply a simple rating to qualify the level of development in the value chain using categories such as weak, average and advanced level of development. The reference for such a rating can be the situation in a neighbouring country's value chain or in another value chain in the country.
- **Identification of main development opportunities:** A reflection on the existing possibilities to develop value chains is necessary. By identifying parameters where the value chain is not performing well and considering both options to realistically overcome these problems and constraints and chances of success, opportunities can be identified. Another way is to think creatively about solutions and learn about best practices and competitor strategies. Strategies can include:

- strengthening the weakest actors in the value chain in order to address possible bottlenecks. Here, the assumption is that development of the weakest segment will trigger the development of all other segments in the value chain;
 - improving the linkages that allow the flow of knowledge and resources to make firms in the chain more productive. The assumption is that the weak linkages between segments and chain actors hinder the development of the chain. Improving the connectivity in the chain, for example by introducing a quality control protocol with which all actors across the chain must comply, is expected to foster chain development. Linkages can also be improved through matchmaking or improved contractual arrangements;
 - creating new or alternative links, for example, by linking local firms in developing countries to global value chains or linking to new, additional lead firms. The assumption is that by making a new link, the value chain is able to enter into new and higher value-adding activities (UNIDO, 2011).
- **Reflection on possible impact scenarios:** Finally, how the achievement of the identified development opportunities will affect predefined development goals must be considered. This does not necessarily involve a new analysis based on sophisticated economic or other models, but an intuitive reflection about what might happen. Possibly, a narrative description of what would happen in case of value chain development is useful here. The analysis should preferably include best and worst case scenarios and reflect on the development's potential (UNIDO 2011). It is important to note that value chain analyses can also be used to formulate impact indicators and monitor value chain promotion projects.

Some tools commonly used in the process of strategy development and the creation of value chain development support measures are subsumed below:

- A prospective **market analysis** can contribute to the development of strategic visions in terms of marketing options that can be pursued by various chain actors. One way of doing so is by analysing the possible development pathways on existing markets and in relation to existing products, as well as the opportunities that arise from new markets and the possibilities of developing new and/or diversified products. One instrument to do so is the Product-Market Growth Matrix (Ansoff, 1957), which can identify business and marketing options for actors in value chains. After enumerating different product and market development opportunities, interesting options can be rated and the existing and potential markets for different products characterized. In a subsequent step, it is possible to identify upgrading needs. Another commonly used tool in prospective market analysis is the Boston Consultancy Group Growth-Share Matrix (Henderson, 1979), in which firms as well as entire value chains can rank businesses and products on the basis of their actual relative market shares and growth rates.
- An **analysis of the industry's lifecycle**, oriented at establishing the state of the industry at the time the decision is taken and the likely state at the time the production capability is actually in place. Therefore, the analysis of demand trends must be complemented with qualitative analysis of what is likely to happen in the future. This includes an in-depth analysis of potential—or attractive—markets and their trends. End-markets can usually be

divided into a range of market segments that absorb different types of products of the value chain (e.g. higher priced quality products or lower priced bulk products).

- An analysis of potential **public and private partnerships**. Many of the interventions and recommendations suggested by value chain analysis can only be implemented by (or in collaboration with) stakeholders in the private sector and associations that represent private firm interests. For example, private companies can use the results of value chain analysis to develop their vision and technological upgrading and marketing strategies. Hence, an analysis of potential partnerships to implement these interventions is key for their success.
- An analysis of **trade dynamics**. For the purpose of policy advice, UNIDO developed a method to evaluate sector competitiveness and value chain performance based on trade dynamics. This method complements standard nationwide competitive indicators (as produced by IMD, WEF and World Bank) and helps stakeholders identify a range of alternative options before defining an action plan. It uses trade statistics to estimate measures of unit value at each stage of the value chain and complements these measures with indicators of domestic export performance (the ECI introduced above) and potential attractive markets (the IDI also introduced above) for each segment of the value chain. By providing information at a highly disaggregated level, the analysis of these indicators can be used to identify potential upgrading opportunities within specific value chains. It also provides valuable information on the value capture potential of the different segments (by looking, for example, at their relative performance in domestic and international markets), which in turn offers interesting insights for building a coherent strategy for positioning within certain GVCs (see Box 4.2, for an example). Beside its use for policymakers, this methodology is also of interest to the private sector, as it provides information on the performance of the value chain of a single product or product group.

Box 4.2: Product competitiveness in the Ecuadorian cocoa industry

According to the Harmonized Commodity Description and Coding System (HS, 1988-1992), products in the Ecuadorian cocoa value chain can be characterized as follows: 1) Primary products: cocoa beans (180100) and cocoa shell waste (180200), 2) Semi-processed products: cocoa butter (180400), cocoa mass with fat (180310), defatted cocoa (180320), cocoa powder (180500) and cocoa powder containing added sugar (180610), and 3) Processed products: chocolate and other preparations containing cocoa (1806).

In 2007, UNIDO was requested to support the Ministry of Industry and Competitiveness of Ecuador to study the competitiveness of its agri-business industries, including the cocoa industry. For that purpose, UNIDO analysed the unit value of each segment of the value chain according to international trade data of 2003. As shown in Figure 4.3, the largest price differential without considering residuals was found among cocoa beans (US\$ 1.02 per kg) and cocoa butter and chocolate (US\$ 3.25 per kg each). The export unit value of the latter two was three times higher than that of the primary product. Given this unit value, the study suggested that a process of industrialization should not necessarily focus on producing chocolate, particularly when the cocoa powder and butter can be used as premium materials in several industries. ▶

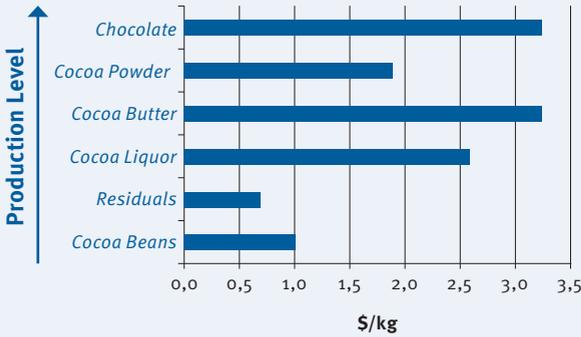


Figure 4.3: Export unit value of cocoa beans, intermediate products and chocolate, 2003

Source: Own elaboration based on UTEPI (2007)

After analysing global prices, the study focused on the ECI (to benchmark the country’s export performance in comparison to other competitors) and the IDI (to identify potential attractive markets for the different segments of the cocoa value chain). Interestingly, the ECI for the chocolate segment showed that all chocolate exporting countries were developed countries, suggesting that this particular segment of the value chain would have strong competition. At the same time, the IDI index for cocoa beans revealed that the centres of cocoa processing were located near the largest consumers of chocolate. According to the analysis, 60 per cent of attractive markets for cocoa beans and around 40 per cent for cocoa butter were located in Europe. These countries, compared to the North American markets, value the unique characteristics of fine and flavour cocoa more. Hence, the study suggested Ecuadorian exporters to expand their presence in those markets. Whereas the Netherlands was the main distribution centre for processed cocoa to the rest of Europe, Switzerland paid the highest prices for high quality cocoa beans and (together with Belgium) for cocoa butter.

Moreover, given that an improvement of living standards and the increase of preferences for high quality chocolate would probably increase global demand for fine and flavour cocoa, the study stressed that the market for high quality cocoa represented an opportunity that should not be missed. The analysis thus provided elements to support the Ecuadorian strategy on value chain development in the cocoa sector. It concluded that Ecuadorian exporters should refocus national production from CCN51-type cocoa towards Arriba-type, because the latter is highly valued in most attractive markets. As for the production segment, exporters were advised to concentrate on cocoa butter (which provides high unit values as seen in Figure 4.3) or cocoa beans. For the latter, however, the study concluded that the market for processed cocoa was controlled by multinational companies, which might open a chain governance issue.

Source: UTEPI, 2007

This chapter has underscored the importance of thorough (integrated) VC analysis as a first step towards effective value chain development. It has also highlighted that the aspects of inclusive and sustainable development in the industrial value chain can feature prominently in GVC analysis, so that they will also feature in the implementation of value chain development interventions.

Value chain analysis can be considered a first step in value chain development. Subsequent steps entail a process of designing and implementation of specific programmes and interventions to support the value chain’s development. The next chapter presents UNIDO’s experience in supporting the development of value chains drawing on its extensive field operations and technical cooperation programmes.

5. VALUE CHAIN DEVELOPMENT: EXAMPLES OF UNIDO TECHNICAL ASSISTANCE

As stated in the previous chapters, GVCs constitute important opportunities for developing countries to become part of the global economy, absorb knowledge and technology and add value to their products. However, to seize these opportunities and make the most from GVC integration, developing countries need to develop the domestic part of the value chain to be fit for global competition. The issue of how to ensure beneficial inclusion into GVCs thus becomes pertinent.

Interventions to foster value chain development and the inclusion of developing countries into GVCs play an important role among governments and development agencies. Even though such interventions have rarely been integrated in nature (in the terms defined in the previous chapter) and might have not been particularly effective in fostering sustainable and inclusive development, they provide fertile ground for learning and improvement towards this end.

The substantial practical experience UNIDO has accumulated through its field operations provides fruitful examples in this regard. The organization runs a large number of projects that support industrial development among different actors engaged in GVCs at several levels (firm, industry, country and government) and contributes to the creation of value chain inclusion strategies. Specifically, in the course of its technical cooperation programmes, the organization has gained experience with value chain development in the following areas:

1. Enhancing capacities for standards and quality compliance
2. Investment promotion
3. Cluster development and export consortia
4. Learning and exchange platforms
5. Greening of value chains.

This chapter presents UNIDO's experience in supporting the development of value chains in the above mentioned areas of technical cooperation and assistance.

5.1. Enhancing capacities for standards and quality compliance

One of the necessary capacities that producers from developing countries need to acquire to be able to participate in GVCs is compliance with technical regulations, quality requirements and standards. Standards compliance may be an important barrier to entry into GVCs and the costs can be substantial. However, many global branders and retailers in GVCs are particularly demanding when it comes to compliance with quality criteria. Others insist on

socially and/or environmentally sustainable certification due to growing consumer concerns related to these aspects.

Food hygiene and food safety standards are particularly important (i.e. HACCP, ISO 22000), but other important international standards also exist, such as quality management (ISO 9001), environmental management (ISO 14001) and social accountability (SA 8000). Corporate Social Responsibility (CSR) is also a factor that international buyers are increasingly focusing on in terms of exporter compliance, especially in light of the international standard on social responsibility (ISO 26000).

Quality and standards compliance requirements are usually pushed down to suppliers and sub-suppliers in the value chain, thus reaching developing country producers. To build and strengthen the often limited capacities of developing countries to comply with standards in GVCs, the following actions are required:

1. The development and/or adjustment of national policies that regulate standards compliance procedures and promote the building of standards compliance capacity via government agencies and programmes. Such “quality” policies need to be harmonized with or become part of other policy frameworks, such as the national industrial development policy, the national trade policy, the national investment policy and many others.
2. The development of capacities of institutions responsible for the governance and compliance of technical regulations and standards. These institutions include national standards bodies to develop and/or adopt standards; metrology institutions to ensure the accuracy of measurement and calibration performed in the country; accreditation bodies to ensure the competence and international recognition of bodies assessing the conformity of standards and regulations; and conformity assessment bodies such as product testing and calibration, inspection services and certification of products and management systems and of inspection bodies. This is usually done in the context of country accession to the WTO and specifically entails the need to fulfil the requirements and obligations under the WTO Technical Barriers to Trade (TBT) agreement and the agreement on the Application of Sanitary and Phytosanitary (SPS) measures. Such a system of institutions should be capable of supporting technical regulations and private and voluntary standards, and may consist of public and private institutions to support, inter alia, quality, the environment, social accountability, food safety and traceability, available to exporters and local enterprises.
3. The development of advisory and support service businesses that help firms implement quality and standards compliance procedures in their productive processes and be able to comply with international standards and market requirements.
4. The development of firm capacity to comply with these standards and regulations and make them a part of their production protocols. This usually includes extensive training and capacity strengthening of production and quality managers at firms, including study tours and exchanges with leading international producers and buyers.

While local firms, international buyers and governments may be able to bear part of the costs for the necessary measures to comply with GVC standards, these activities are usually underfunded and remain underdeveloped. As a consequence, firms from developing countries

might remain excluded from GVCs. Hence, building or improving the quality and standards compliance capacity of developing countries constitutes an important domain of public investment and the involvement of donors and development agencies.

As a part of UNIDO's activities on trade capacity building, an extensive portfolio has been developed to help developing countries enhance their quality and standards compliance capacity. This usually involves a combination of the four actions mentioned above, tailored to the needs of specific countries. It also involves the identification of industries, clusters and firms in which compliance capacities are required most, depending on development opportunities, export potentials and competitiveness levels.

UNIDO's experience in this field also demonstrates the importance of taking into consideration that standards compliance capacities need to evolve in response to changing market requirements and regulations – examples here include the Colombian cosmetics industry's compliance with EU regulations (see Box 5.1) and the smart-trade concept for Indonesian fish (see Box 5.2).

Box 5.1: Developing capacities for standards compliance in Colombian cosmetics

By 2032, Colombia aims to become a world leader in the production and export of cosmetics made from natural ingredients. However, to become a world exporter and to fully integrate into the regional and multilateral trading system, Colombia needs to enhance its trade capacity, strengthen the National Quality Subsystem (NQS) and improve compliance with international quality and sustainability standards throughout the entire cosmetics value chain.

More specifically, the country needs to consolidate and gain international recognition of its quality infrastructure and conformity assessment services in terms of calibration, testing, inspection, accreditation and certification, among others.

To do so, Colombia is now pursuing three main goals: i) developing a laboratory infrastructure that is competitive, compliant and internationally recognized; ii) building capacity to offer conformity assessment services to national enterprises and neighbouring countries to enhance trade opportunities; and iii) improving the technical know-how and compliance capacity of SMEs.

UNIDO is currently supporting Colombia in this endeavour by providing technical expertise in the following areas:

- ✓ Capacity to provide services among the institutions of national quality infrastructure, i.e. providing training and coaching for staff in these institutions;
- ✓ Technical support to local laboratories that render services to the industry and its value chain, e.g. by assisting in pilot testing for natural ingredients in the cosmetics industry;
- ✓ Pilot technical support and training for entrepreneurs in SMEs to comply with quality standards and market requirements in regard to their natural ingredients production activities for the cosmetics industry;
- ✓ Adoption of the OECD evaluation system for Good Laboratory Practices for chemicals;
- ✓ Training and rating of experts and consultants to provide technical advice to stakeholders along the value chain in regard to quality and market requirements.

Source: UNIDO Project, 2014-2018

Box 5.2: Building capacities for standards compliance in the Indonesian fish industry

To become a viable player in the global fisheries value chain, the Indonesian fish industry must strengthen its export policies and improve the quality of its products. In a Swiss-funded project, UNIDO is assisting the Indonesian fish industry in the application of quality and sustainable production standards to promote the sustainable use of maritime resources. While other components of the project focus on linking exporters with buyers in Switzerland and EU, UNIDO specifically focuses on the following areas:

- Improving necessary business support services to enhance the export quality of firms' fisheries products.
- Provide policy advice on mainstreaming the sustainable use of maritime resources, preservation of biodiversity, poverty reduction aspects and gender equality.
- Support the setting up of the Quality and Productivity Centre at the Indonesian Fisheries University to provide support to local SMEs.
- Development of a curriculum for a masters' training course on quality, productivity and innovation at the university.
- Piloting of certifications for sustainability schemes as required by key markets.

Several potential products/species (shrimp, catfish, milkfish, skipjack, nila/tilapia and seaweed) and various potential target regions have been identified in cooperation with national stakeholders. UNIDO also cooperates with other specialized agencies (ITC, the Swiss Import Promotion Programme, universities, the Swiss Federal Institute of Intellectual Property), who lead in the respective fields, while maintaining overall responsibility for implementation.

Source: UNIDO Project, 2013-2018

Fostering the inclusion of the poor in the value chain plays a significant role in UNIDO's standards compliance portfolio. This, for example, is the case in the cinnamon value chain in Sri Lanka, where small-scale farmers are supported to comply with quality standards and good agricultural practices (see Box 5.3).

Box 5.3: Developing quality compliance capacity among cinnamon producers in Sri Lanka

Among the many spices that Sri Lanka grows and exports, cinnamon—also called true cinnamon or Ceylon cinnamon—is one of the oldest and most recognized worldwide. However, over the last decade, Sri Lanka has lost 5 per cent of its global trade share for cinnamon annually. In an effort to revitalize the global market position of Ceylon cinnamon and to boost its competitiveness, the Government of Sri Lanka unveiled a new logo under the brand name “Pure Ceylon Cinnamon” to distinguish the country's cinnamon products. At the same time, the Spice Council, representing all key stakeholders in Sri Lanka's cinnamon industry, made an agreement with UNIDO to establish a partnership in the implementation of “Enhancing the compliance and productive capacities and competitiveness of the cinnamon value chain in Sri Lanka”, a three-year project that was launched in May 2012. ▶

A value chain diagnostic revealed that there is a significant shortage of skilled peelers (demand for 70,000 workers versus a supply of 30,000). This discrepancy cannot be bridged by the 1,000 people trained by the Department of Export Agriculture of Sri Lanka of which 30 per cent dropped out due to social stigma and reduced economic attractiveness. Skilled peelers are required to obtain certification (ISO, HACCAP and GMP) which is accorded to groups and larger estates of smallholders. It was also found that certified production systems and methods with an appropriately coached and trained skilled workforce in an environment of standard work ambience have a major impact on productivity. The diagnostic also indicated that there is a certain lack of skills among farm workers, a lack of an institutionalized system to assure market conformity standards and weak overall R&D activity for new technologies, as well as limited access to processing technologies, all of which represent severe bottlenecks for the value chain's competitiveness and growth.

The diagnostic identified two main entry points for UNIDO interventions: a) primary activities related to the production and supply of raw materials to end-markets and consumers, and b) support activities including input supplies, services, standards and conformity.

As a result, the UNIDO project helped establish the National Cinnamon Training Academy which is responsible for the delivery of training programmes related to food safety and hygiene. Further, UNIDO and the Standards and Trade Development Facility (STDF) of the WTO collaborated with the Spice Council to establish an institutional and legal framework for the training academy, develop a national training programme for the cinnamon value chain and promote internationally recognized food safety certifications, especially GMP certification for cinnamon processing units.

The project has also helped Sri Lanka obtain Geographical Indication (GI) protection for Ceylon cinnamon. GI registration will provide Ceylon cinnamon with an exclusive identity and thus promote its position in global trade. These combined activities contributed towards SPS compliance along the cinnamon value chain.

Source: UNIDO Project, 2012-2015

In other cases, the emphasis is on using standards compliance capacity development to increase the level of value that developing countries are able to add to primary products. This, for example, is relevant in the case of cotton processors in a range of African countries receiving support from UNIDO and in the case of the saffron value chain project in Iran, where UNIDO is supporting the Agricultural Bank of Iran in setting up processing facilities that comply with the highest international quality standards (see Box 5.4). Quality processing capacity has also been built with UNIDO support in Pakistan's horticulture value chain (see Box 5.5).

Box 5.4: Adding value to saffron production in Iran

Iran provides more than 95 per cent of saffron production in the world market. However, most of the raw materials are simply exported in bulk. Iranian saffron processing and packaging firms focus primarily on the domestic market. Those that actually engage in export activities do not package their products in a way that meets international customer expectations. The global market for saffron is therefore mainly managed by large international buyers from UAE, Spain, Italy and the United States, which repackage the saffron products in accordance to local consumer needs before marketing and distributing them to the final product market. As a result, despite being the main producer, most of the added value generated remains outside Iran. ▶

To realize the full potential of this industry in terms of value creation in the global market, Iran's Bank of Agriculture operates a value chain promotion programme using UNIDO assistance in the provinces of Khorasan Razavi and Khorasan Jonoubi. The objectives of the project are to increase the export volume and export value of saffron and saffron products and to increase the income of stakeholders along the value chain. The main strategy has thus been to promote an increase in farm productivity, market development with access to international buyers and product development with a focus on differentiation, in all cases linking these activities to quality enhancement measures. It is expected that this project will contribute to the improvement of saffron production, particularly in the processing and packaging segments of the value chain. The project also aims to increase the share of Iranian SMEs in the global saffron market by equipping these firms with the necessary tools for direct access, and to build the capacity of export-oriented networks to bring Iranian saffron SMEs closer to their international end market customers.

Source: UNIDO Project, 2014

Box 5.5: Building quality processing capacity in Pakistan horticulture

In Pakistan, UNIDO has contributed to specific value chain interventions along the mango and kinnow mandarin chains aimed at improving their global competitiveness by developing and disseminating codes of practices (COPS), supporting the quality of fruits, developing trade arrangements along the international supply chain and other up-scaling activities.

International experts fielded under UNIDO's Trade Related Technical Assistance (TRTA II) programme provide technical advice to national institutions, identify and develop approaches and guidelines for the adoption/adaption of best practices in Pakistan with reference to international standard compliance. National institutions guide Farm Field Schools (FFSs) which become a resource development pool to gather farmers both from cluster groups and participants in COP programmes to discuss and share each other's experiences and knowledge.

To further disseminate the COPs, the TRTA II programme organized a Training of Master Trainers, which gave detailed presentations on each and every aspect of mango and kinnow farming and processing. Recognizing the lack of exposure to the international market, the TRTA II programme developed trade arrangements along the international supply chain and organized a study tour to European high end markets, facilitating the consortium and participating in promotional campaigns in Malaysia and Singapore for direct exporting. Moreover, it also provided a horticulture equipment kit for mango and kinnow farmers to support a higher quality level of fruits and successfully introduced the concept of Small Scale Hot Water Treatment units based on the experience of the Philippines. These units aim to control fruit fly infestation and contributed to extending the shelf life of the produce, thus favouring export activity.

Source: UNIDO Project, 2015

In some cases, the development activities for quality and standards compliance are also combined with other measures of trade capacity building and industrial development, such as support for building export consortia, SME development, technological upgrading, product development, marketing strategy development, linking to international buyers, promotion of domestic and foreign investment, etc. Here, UNIDO also cooperates with international partner agencies such as WTO, ITC, FAO and CFC, and with donors and the private sector.

5.2. Investment promotion

Foreign and domestic investors play a key role in global value chain development, and the direction and scope of this role can be influenced by the host country's pro-active and concerted approach in terms of investment promotion. Investment promotion can foster value chain development by playing a role in the following areas:

- **Information on investment opportunities.** Government agencies, development programmes or investment promotion departments of private sector associations can provide potential investors with access to up-to-date and reliable information on activities, projects and companies in which they can invest. This usually involves the development and publishing of investment options or profiles for certain value chains, sub-sectors or businesses. Conducive transmission channels of investments can be established through collaborative agreements, in particular, mixed domestic-foreign joint ventures. In other cases, production assets for value chain development would need to be built from scratch through *greenfield* investments. Investment profiles are most successful if they are developed for certain value chains, based on solid value chain analysis (see Chapter 4) and complemented with an analysis of financial feasibility. Further inventories can be developed and published with information on firms searching for foreign or domestic investors (such as buyers or suppliers) requiring equity capital and aim at creating joint ventures.
- **Attraction of FDI:** The attraction of foreign investors can be a major factor in domestic value chain development. Modern approaches to promoting foreign direct investment involve measures such as matchmaking (finding and bringing business partners together) and stimulation of investments through localized incentive schemes. In a GVC context, FDI might be horizontal or vertical (Shatz and Venables, 2000). In horizontal FDI, foreign investors deploy similar production systems in different host countries operating through a network of foreign subsidiaries and aim to gain new market shares in that market by reaping economies of scale. In vertical FDI, typically the most extended type of FDI in the context of GVCs, subsidiaries of multinational companies search for new suppliers. Such investment secures foreign investor access to locally available supplies. Domestic production turns into intra-firm exports in a vertically integrated GVC with FDI taking the lead. Technical assistance projects, such as those implemented by UNIDO, can provide support in all these areas. By establishing business linkages, foreign investors can help local firms upgrade their capabilities to encompass more demanding tasks, which might move them up the value chain to the point at which they become regional or global players. This, in turn, generates learning and knowledge accumulation among local firms and leverages the host country's technological capabilities. The deeper the relationship with domestic firms, the more foreign investors will be motivated to keep their operations in the country for the long term (Caldas Lima, 2008).
- **Registration, permits and licences.** Obtaining the necessary documentation for firms to be able to operate can often be tedious and take time, particularly in developing countries. Governments therefore often develop *one-stop* centres that assist firms in dealing with all bureaucratic procedures. These centres provide support to potential investors to register their business and acquire permits and licenses. UNIDO and other development agencies have introduced several technical assistance programmes to set up and operate this type of centres. Their success largely depends on the extent to which specific registration or

licensing bodies in the government are able to commit. Often, cluster organizations or business development outlets of private sector associations assume the role of business and registration facilitation in specific areas.

- **Business plans and access to finance.** Investors, in particular domestic investors, can receive support to develop and implement business plans and gain access to finance from the local banking system or through the attraction of equity investment. Good ideas for starting new businesses might not be realized if the capacity to translate them into business proposals is lacking or if the necessary market/pricing information is unavailable. Particularly, smaller domestic firms in developing countries often lack the entrepreneurial skills to develop solid and fundable business plans that adequately picture the relationships with buyers and suppliers in the value chain. In such cases, technical assistance and business incubation projects, as those carried out by UNIDO, can provide finance and business plan development expertise and help companies start such projects. Further consultation and technology tie-up support can help mitigate the risk of mortality during the inception phase or immediately after the incubation phase.
- **Adaptation to local conditions.** Investors may be ready to engage in businesses but encounter local conditions whose absorptive capacity for knowledge and technology for production are not adequate and a significant element of learning and know-how transfer is required. In such situations, technical cooperation projects, such as those carried out by UNIDO, can provide the necessary knowledge and technology to make businesses viable and render investments profitable. Such programmes can target knowledge and technology for particular value chains. Technology can be transferred, for example, by setting up a pilot production plant. It can also be provided by a foreign investor through a specific licensing agreement. The further adaptation and modification of foreign technologies and the training of local staff is another important activity that can be supported through technical cooperation. A newer form of technology transfer is “technology lending”, in which international firms provide their technology to produce the parts needed for other segments of their global operations.
- **Quality and other standards.** Once international investors have identified a local investment opportunity, they might be challenged by an obsolete and inefficient production system that requires modernization to reach competitive levels. In such cases, investment promotion programmes can support local businesses by promoting the right mix of modernization investments and management trainings to attain the desired quality and other standards to enter into a specific segment of the value chain. In some cases, this can be matched with support from investors who, for example, can provide training and engineering support for domestic firms. The latter is more likely to occur when multinational firms have a broad mandate in terms of CSR, which includes elements of supplier development and technology support.
- **Investment promotion agencies (IPAs).** Most of the above activities are carried out by competent government agencies. In fact, most countries have set up IPAs, occasionally in combination with export promotion functions (Wells and Wint, 2000). UNIDO has been actively engaged in supporting the setting up and operation of such agencies, providing large-scale capacity building support and developing strategy plans and global road maps for investment promotion of IPAs. The internal management information systems of these

agencies have been improved and their investor after-care support systems (i.e. support to existing foreign investors) have been established or expanded. These programmes are also intended to build IPA capacities to generate investment opportunities and to assume a facilitator role in negotiations between joint venture partners. Such efforts are most effective when coordinated between different government agencies and private sector associations. As UNCTAD asserts “Ever intensifying trade and investment links in GVCs call for closer coordination between domestic trade and investment promotion agencies, as well as better targeting at specific segments of GVCs in line with host countries’ dynamic locational advantages.” (UNCTAD, 2013, p. 193).

- **Business climate.** Investment promotion needs to be complemented by policy measures that lead to a more conducive business climate (UNCTAD, 1998). UNIDO support also contributes to identifying key economic or political determinants and obstacles to investments. UNIDO’s work in this area has generated empirical evidence through field surveys as well as case studies which created a robust framework for evidence-based policy advice to support a virtual cycle of investor-friendly business climate reforms.

By addressing these different dimensions, investment promotion should take a proactive approach to ensure that quality investments are attracted in productive sectors and that supportive business services are provided to enforce productive linkages between economic sectors. Among other elements, this requires an assessment of the impact of investments and particularly FDI in a given host country’s value chain, as well as the monitoring of investment performance along a set of measurable indicators related, for example, to productivity performance, employment creation and sales growth.

Two major initiatives illustrate UNIDO’s work in the area of value chain-related investment promotion: the Subcontracting and Partnership Exchange (SPX) programmes and the Investment Monitoring Platform (IMP). In what follows, we present the details of both initiatives.

5.2.1. Subcontracting and Partnership Exchange (SPX)

Over the last 25 years, UNIDO has established and implemented the SPX programme in more than 60 countries worldwide, thereby creating a global network that aims to effectively support the integration of domestic enterprises in local, regional and international supply chains and to better meet the challenges of globalization¹⁸. Recently, the SPX programme has benefited from extensive improvements both in terms of programme tools and methodologies. By partnering with a number of institutions in various countries (both public agencies and private sector associations), UNIDO has established a new generation of SPX centres. These centres aim to strengthen the ability of domestic companies (particularly SMEs) to capture emerging subcontracting opportunities in domestic and international markets through assisted and improved production capacity and performance.

The SPX programme comprises three main components:

¹⁸ More information available at <http://spx.unido.org/>

- a) **Matchmaking:** Within each national SPX office, a local team, supported by UNIDO, works to link buyers with both current and potential suppliers and sub-contractors. The SPX team develops profiles of the skills and capacities of local firms to be promoted among buyers, and provides customized support to buyers looking for competitive local suppliers. SPX centres use a unified Management Information System (MIS), launched in 2012, to help build databases of local enterprise capacity, collate requests for quotations (RFQs) and provide a gateway to international benchmarking and information resources. The purpose is to identify priority products and services that can be locally produced, identify key buyer requirements for these products and services and sensitize potential suppliers of these products to business opportunities. Workshops are organized to inform suppliers about buyer requirements and to undertake initial matchmaking with local suppliers. Ultimately, buyers should see the SPX programme as an integral part of their business process, which expands the programme's functionality beyond the mere channelling of RFQs and promotes SPXs through international events. After the demand structure is exhaustively analysed, the respective SPX centre examines existing data sources from various institutions in the country to arrive at an understanding of existing regional supply chain structures, including best practice examples from other developing countries. This exercise is sometimes complemented by a situational analysis of the economic, commercial and legal practices of industrial subcontracting, supply chain management, procurement and outsourcing. The results are combined to define strategic industrial sectors where SPX interventions can be most effective in linking the local SME sector to national and international production networks.
- b) **Benchmarking:** SPX benchmarking compares the operational performance and practices of a company against those of other companies of a similar size and type. This enables companies to objectively assess their businesses, to clearly see their position in relation to international practices within their industry (nationally, regionally and globally) and where they need to upgrade to meet buyer requirements.
- c) **Capacity building:** SPX capacity building for supplier development and upgrading assists potential suppliers to formulate investment proposals, mobilize financing and identify technology partners. In this sense, the local SPX team mobilizes locally available support organizations for enterprise development and investment promotion, and assists companies in gaining access to finance to respond to the needs identified in the benchmarking diagnosis. UNIDO also provides global support by contracting global procurement organizations, international chambers of commerce and global donor organizations to promote interaction between various networks. UNIDO Investment and Technology Promotion Offices (ITPOs) link interested business partners from various host countries with SPX centres and connect them to investment opportunities evolving from supplier upgrading plans. ITPOs sensitize small-scale industries to the business opportunities in developing countries. Their involvement includes the development of an investment project, matchmaking, assistance in negotiations and investment project completion.

The following boxes provide two examples on how these SPX centres work.

Box 5.6: UNIDO's platform for Investment Monitoring and Supplier Development in Viet Nam

UNIDO implemented the Project 'Platform for Investment Monitoring and Supplier Development Phase I' in Viet Nam between 2009 and 2012. The project aimed to improve monitoring and management of investment flows by national institutions and private sector decision makers, and to equip the domestic manufacturing sector to present itself as a viable and competitive supplier base for global enterprises. The project was designed to facilitate the shift in investment promotion strategy from quantity to increased emphasis on quality of investments, measured in terms of the impact of FDI on the domestic economy, while maintaining volume momentum. More specifically, the key goals of the project were to:

- Improve the monitoring and management of investment flows by national institutions and private sector decision makers through the establishment of a web-based investment monitoring platform as a tool for analysis and management of foreign direct investment;
- Support the domestic manufacturing sector to present itself as a viable and competitive supplier base for global enterprises through the establishment and strengthening of supplier benchmarking and a Subcontracting and Partnership Exchange unit within the Viet Nam Chamber of Commerce and Industry (VCCI).

The outputs from this programme included a) an Industry Investor Survey of foreign and domestic investors and publication of the Viet Nam Industrial Survey Report in English and Vietnamese¹⁹; b) the establishment of the Viet Nam Investment Monitoring and Management Platform (VIMP) as a tool for developing investment promotion strategies; and c) introduction of UNIDO's benchmarking methodology and supplier development tools as part of the SPX programme as a complement to the VIMP for leveraging the supplier base of Viet Nam in investment promotion.

The project involved a wide range of capacity building initiatives mainly related to i) SPX training and SPX programme implementation support (profiling, buyer engagement, SPX promotion, SPX benchmarking methodologies); ii) the implementation of investor surveys (questionnaire construction, sampling methodology, survey implementation, interview process, data generation, data analysis, interpretation and report writing; and iii) training for investment promotion officials on how to use the VIMP.

The VIMP is now helping Vietnamese policymakers and other private sector decision makers to take more informed and evidence-based investment decisions. Through the establishment of the SPX programme within the VCCI, contacts between buyers and suppliers as well as concrete matchmaking results have been registered with resulting positive impacts on SME expansion and growth along different value chains.

Concrete results from the SPX implemented in this project include:

- SPX programme with 675 profiled enterprises uploaded to the respective UNIDO SPX Management Information System;
- SPX capacity building including training on profiling, benchmarking, buyer engagement and matchmaking, and initial contacts established with key buyers in the country;
- SPX programme methodology (including the profiling of enterprises as well as benchmarking of supplier firms) implemented in the northern and southern provinces in Viet Nam;
- Benchmarking of 40 enterprises through UNIDO's specific SPX benchmarking tool for further use in supplier development and upgrading processes as well as for investment promotion;
- 50 Buyer Opportunity Reports produced as a result of the buyer engagement and matchmaking process, serving to identify opportunities for local subcontracting opportunities;
- Representative from SPX Viet Nam participating in the "Delegate Programme" of the ITPO in Tokyo and Seoul in 2011 and 2012, serving to link investment attraction efforts as well as broader sensitization of the SPX programme to existing and prospective investors from Japan and the Republic of Korea.

Source: UNIDO, 2012b

19 Available for download at http://www.unido.org/fileadmin/user_media/Publications/VIIR_print.PDF

Box 5.7: UNIDO' Industrial Subcontracting and Partnership Exchange (SPX) in Xi'an, China

In 2007, UNIDO established a SPX programme in Xi'an, Shaanxi Province of China. Programme implementation comprised two phases, the second of which began in 2014 and will last until 2016. The host institution of this programme is Xi'an Productivity Promotion Centre, which reports to the Ministry of Science and Technology of China. In the current phase, the project focuses on maximizing the development and economic impact of large state owned enterprises, national procurement bodies and domestic and foreign companies operating in Xi'an and the wider Shaanxi Province.

Overall, a total of 620 companies have received SPX profiling services, with a sizeable share earmarked for subsequent SPX benchmarking services. During this period, the SPX benchmarking tool has been fully translated into Chinese, enabling SPX Xi'an to generate benchmarking reports in the local language, easing further dissemination of the UNIDO SPX tool.

In terms of buyer engagement, some 83 buyers have been engaged by SPX Xi'an, including 25 companies from the automotive, machining and power tools industries, with whom in-depth discussions were held during most of 2014. To date, SPX buyer engagement activity has resulted in 330 requests for information, 82 requests for proposals and 59 requests for quotations. A total of 160 supplier shortlists have been presented to prospective buyers, which, to date, are at the stage of further contractual discussions.

Since the SPX programme started, some 20 matchmakings between suppliers and buyers have been registered, resulting in subcontracting agreements and contracting volume worth at least US\$ 7.6 million.

Source: www.spx-xian.org

5.2.2. Investment Monitoring Platform (IMP)

The Investment Monitoring Platform (IMP) is another major component of UNIDO's work in investment promotion²⁰. The IMP is a global web-based tool that serves to host, analyse and share investment-related data that is generated from large-scale investor surveys implemented by UNIDO. The focus lies on foreign subsidiaries in the manufacturing sector. These surveys, in turn, are designed to provide a means for participating countries to assess their own needs for improving their investment climate and to formulate the required interventions. They also enable empirical analyses that can be used by intermediary organizations to improve their advocacy function as well as their institutional performance in stimulating investment into productive sectors. The data collected in these surveys and the related analysis of FDI characteristics complements the overall FDI inflow and stock data provided by Central Banks' balance of payments (BOP) statistics. This allows capturing underlying trends and critical issues that rarely emerge from BOP statistics due to conceptual and methodological problems. By means of this data, it is also possible to produce indicators to rank countries in terms of governance parameters, and to compile forward looking indices such as, for example, future investment flows, employment growth, capacity utilization and skill gaps.

²⁰ This platform is available at <http://investment.unido.org/>

With this initiative, UNIDO has contributed to fostering the ability of IPAs to select categories for investment targeting, understand the priority decision criteria of the targeted investor categories and craft strategies, service offerings and policy advice accordingly. More specifically, the general aims of this initiative are the following:

- enabling cross-country comparisons on the operational performance of enterprises;
- provision of enterprise data that enables the IMP to be a common platform upon which collaborative decisions between companies and other stakeholders can be made;
- enabling participating institutions a) to assess new changes in regional trade conditions, b) to influence investment patterns, and c) to identify regional opportunities and growth areas;
- spurring regional cooperation among IPAs via a) support for regional public-private sector dialogue, b) promoting regional initiatives for investment, and c) fostering inter-enterprise cooperation agreements.

Box 5.8: The African Investment Promotion Agency Network (AfrIPANet)

Through its Africa Investment Promotion Agency Network (AfrIPANet) initiated in 2001, UNIDO has developed close cooperation amongst IPAs from more than 30 African countries and created a sounding board for UNIDO in sharpening its investment and technology promotion activities. Under the aegis of AfrIPANet, five rounds of investor surveys have thus far been conducted in 2001, 2003, 2005, 2010 and 2013. The recent round of investor surveys covered 7,000 companies in Africa, both domestic and foreign, from a total of 20 African countries. Survey reports were produced after each survey round and have been widely acknowledged for their novel and genuine contribution to the debate on investment and particularly to FDI in Sub-Saharan Africa.

The Africa Investor Report 2013 provides evidence in the form of indicators that allow measurement of the impact of different categories of foreign investors in the domestic economy, in particular, their interaction with domestic investors and their propensity to crowd domestic investment in or out. The report assesses the impact of changes in the investment climate and government interventions on the performance and investment decisions of the same investors. This analysis thus informs and empowers intermediary organizations to conduct policy advocacy based on empirical evidence that addresses some of the most pressing concerns of investors.

Below are the main features of the investor survey dataset, comprising more than 300 variables per responding firm. The data is presented on UNIDO's IMP, thereby allowing for interactive analyses of different types of users, particularly member IPAs of AfrIPANet.

Table 5.1. Main features of UNIDO’s Investor Survey Dataset

		Dataset	
		Foreign	Domestic
1	Issues	Ownership structure Project concept Sources of technology Local content Export (Access to new markets) Supply chain interactions (upstream and downstream) Business service needs from IPAs Fiscal contributions (tax, fees, & forex etc.) Incentives & incentive negotiations Project related infrastructure	
		<ul style="list-style-type: none"> • Technology transfer to host country • Knowledge transfer to host country • Standards introduced to host country • Linkage of economy to global value chains • Local sourcing and downstream linkages 	<ul style="list-style-type: none"> • Technology Transfer Agreements • FDI partnership interest (JV) • Technology & knowledge transfer needs • Diaspora investment • Competitiveness • Industrial diversification
2	Data collection mode	Face to face interviews	<ul style="list-style-type: none"> • Face to face interviews • Hardcopy questionnaire and telephone interviews
3	Sustainability	System in place for survey methodology, (electronic data checking, consistency testing and entry procedures), IT infrastructure, stakeholder networks and survey management. UNIDO will recruit enumerators every two years.	Capacity building will enable enumerators from IC Member institutions to carry out the domestic survey.
4	Outputs	Cross-section analysis between FDI and domestic investors Impact analyses Promotion of foreign investor and domestic investor partnerships and interactions Evidence-based policy advocacy	
		<ul style="list-style-type: none"> • Comprehensive foreign investment data • Core FDI indexes and indicators • Special issues of interests highlighted in every Survey Report • Targeted foreign investment promotion • Time series 	<ul style="list-style-type: none"> • Domestic investment facilitation services • Investor relationship management system • Business to business interactions between domestic to domestic and to foreign firms • Needs assessment for domestic private sector on various issues • Promotion of domestic private sector.

5.3. Cluster development and export consortia

Clusters are geographic concentrations of interconnected firms as well as associated institutions which, in a value chain context, produce similar goods or services. Firms in a cluster are part of the same value chain. As they produce similar or related goods or services, they can benefit from economies of scale in their engagement in collective action for the procurement of supplies and the marketing of their products. They can also benefit from information exchange, joint learning and the development and adaptation of innovations. The latter is particularly relevant because cluster-based entrepreneurs and workers often share similar socio-cultural backgrounds and practice reciprocity and self-help. Vibrant clusters are home to innovative firms that reap the benefits of an integrated support system and dynamic business networks. Cluster development often focuses on supporting SMEs and even informal entrepreneurs who have weak relative power within the value chain and are subject to buyer and supplier dominance. Supporting these entrepreneurs then comes with an angle of inclusiveness, targeting the poor and marginalized parts of society and supporting them for value chain inclusion.

Cluster dynamics are often an important phenomenon in value chains. This does not, however, mean that they play an important role in all value chains; indeed, some value chains may not even consider any cluster-based organization of production. In any case, where clusters are important in value chains, there are cluster-based development interventions that contribute to value chain development.

Many clusters in developing economies show a sluggish performance and are resistant to improvement and growth. Firms within stagnating clusters face severe bottlenecks. They often operate outdated, often environmentally hazardous technologies. Shortages in infrastructure and basic services limit their ability to improve product quality and capture emerging market opportunities. The labour force is poorly skilled and entrepreneurs lack access to credit and other services to expand their business operations. These bottlenecks, in turn, are major obstacles for meeting international standards in terms of quality and efficiency necessary for successfully integrating into GVCs.

UNIDO has formulated an approach to cluster development and has been involved in the implementation of cluster and network development projects in more than 20 countries (including Bolivia, Brazil, Ethiopia, India, Mexico, Nicaragua, South Africa, Turkey, Uganda and Zimbabwe) over the last 20 years. An essential feature of UNIDO's approach is its focus on working with existing clusters rather than creating new ones. While existing clusters often demonstrate substantial though unrealized potential, the creation of clusters from scratch is likely to lead to a top-down process, with the private sector having limited incentive to assume a leading role. UNIDO's approach to cluster development (see UNIDO, 2013f) suggests phases of cluster selection, a diagnostic study of the strengths, weaknesses, opportunities and threats to the cluster, vision building and development of an action plan, management and coordination of the activities outlined in the action plan, including the establishment of horizontal and vertical networks as well as the monitoring and evaluation of the results of the cluster development effort. UNIDO offers a range of services to private and public sector institutions engaged in cluster development (See Box 5.9 for an example of this type of programme).

Box 5.9: Improvement of skills and capacities in the Indian automotive component industry

In November 1998, UNIDO, together with the Government of India and the Automotive Component Manufacturers Association of India (ACMA), launched the UNIDO-ACMA Partnership Programme for the Indian automotive component industry. The objective of the Partnership Programme was to strengthen the capacity of small- and medium-sized automotive component manufacturers to meet the quality requirements of vehicle manufacturers and to enhance their productivity and performance levels.

The targeted companies were diagnosed as having some common challenges, such as inadequate skills of the workforce for the relevant activities, machines and processes resulting in frequent accidents, low employee motivation and high absenteeism, lack of knowledge about how to avoid waste, low machine utilization and high inventories, high changeover time, lack of instant access to tools, frequent equipment breakdown, low quality standards and high operating costs.

The programme was carried out in three phases, gradually increasing the number of companies and regions covered by the project and upscaling project activities. Through seminars, workshops and study tours, the participating enterprises were exposed to concepts related to global sourcing, marketing, accounting and finance, delivery requirements, quality standards, costing and other aspects. Growing awareness of these issues prompted a number of enterprises to develop marketing materials and strategies geared towards meeting the expectations of foreign partners.

As a result, significant improvements were yielded in technical aspects (productivity and turnover increases, safer production methods and better use of existing machinery and equipment). Moreover, the workshops and seminars implemented contributed to the development of marketing strategies that resulted in a positive increasing trend in sales for participating firms. At the level of individual clusters, firms have shown an average 51 per cent improvement in their inventory turnover ratio, 7 out of 8 clusters recorded an improvement of more than 100 per cent in Phase 3 alone. Moreover, there has been a 70 per cent reduction in customer complaints across all participating firms in general. Finally, the programme has also enhanced an emerging culture of continuous improvement which has fostered collaborative efforts among participating enterprises, such as networks and other mechanisms for information exchange and experience sharing. Overall cluster performance in the area of equipment effectiveness increased by 67 per cent, and overall cluster performance for in-process rejection saw a steady decline of 160 per cent.

Source: UNIDO Project (1999-2010)

Similar to the Indian case, the ultimate beneficiaries of another programme in South Africa were largely Tier 1 and SME automotive component suppliers, but in that programme, more emphasis was put on environmental issues. Companies were expected to benefit from improvements in shop floor organization, more reliable project management and more efficient energy and resource use. A majority of the companies selected required interventions in lean production and assistance in cleaner production. UNIDO was able to provide key training and improvement methods (see Box 5.10).

Box 5.10: Supervisor, project management and cleaner production training in South Africa

In 2009, the Government of South Africa launched the Automotive Components Supplier Development Plan in cooperation with UNIDO. This plan aimed to enhance the competitiveness of South African SMEs in the automotive component industry by improving operating efficiency at the plant level through the provision of effective continuous improvement services by the Automotive Industry Development Centre (AIDC). The programme was implemented in two phases and covered 65 component manufacturers across four provinces in South Africa.

The key challenges the companies faced included high electricity and gas consumption, inefficient machinery, high changeover times, high absenteeism and defect rates, lack of energy performance measurements and a lack of performance management. Addressing these issues entailed management and supervisor training, project management training and cleaner production training, the latter having the purpose of enabling companies to identify cost saving opportunities in energy, water and other inputs.

- The Testing Phase (2009–2011) sought to complement the methodology of the already existing Tirisano Programme²¹ (firm-level assistance and inter-firm learning) with several new modules, to establish a benchmarking methodology for both process and environmental benchmarking, and to eventually test the new modalities with 15 companies over a 12-month period from 2009 to 2010.
- The Rollout Phase (2011–2012) covered the remaining 50 component manufacturers and was implemented based on a number of adjustments or lessons learned from the Testing Phase. The Rollout Phase was characterized by an improved geographical spread of component manufacturers and featured higher participation of lower tier firms. In terms of consultation requested, there was also an increasing interest in cleaner production and resource efficiency-related services as well as supervisory skills training. This phase focused on increased marketing and promotion training, enhanced capacity building (e.g. through a study tour to India), as well as on monitoring and evaluation workshops.

The total savings realized during the Testing Phase were ZAR 10.34 million. Given that the average contribution per company during the Testing Phase was approximately ZAR 90,000, the savings achieved compared favourably with company contribution. Furthermore, a total return on investment (ROI) was indicated at a level of 1:2.8, which means that for every Rand invested in the programme, a saving of ZAR 2.8 was achieved.

During the Testing Phase, more than 2,000 company staff and experts benefited from the training provided in different components of the programme. Approximately 32 firm representatives were trained in cleaner production methods and approaches.

The total cost savings during the Rollout Phase were estimated at approximately ZAR 62 million, with 49 per cent of savings attributable to lean manufacturing interventions and 45 per cent of savings attributable to cleaner production-related initiatives. The ROI amounts to a ratio of 1:3.88 for the Rollout Phase, based on investments made in the programme for 50 companies versus the total savings indicated. This means that for every Rand invested, a saving of ZAR 3.88 was achieved.

The results of the impact assessment completed by an independent analyst in the aftermath of the programme indicate that the companies participating in the Rollout Phase achieved an approximately 25 per cent ROI improvement compared to an 11 per cent improvement among similar South African firms over the same period.

Source: UNIDO Project (2009-2012)

²¹ The AIDC developed a manufacturing competitiveness programme in 2002 in partnership with CII (Confederation of Indian Industries) and UNIDO, 'Tirisano', for South African automotive suppliers. The Tirisano programme has since been one of the AIDC's key programmes for supplier development and has been implemented in more than 120 South African automotive suppliers.

The creation of export consortia relates to cluster development. For many SMEs, exporting is often a complex business involving high risks. They may lack the necessary knowledge and financing, may not meet foreign regulatory requirements, may produce products in quantities or in a quality that are inadequate for foreign buyers, or may simply not have access to or knowledge of potential attractive markets. These problems can often be overcome through cooperation among SMEs and by setting up export consortia.

An export consortium is a voluntary alliance of firms with the objective of promoting the export of goods and services. By combining their knowledge, financial resources and contacts within an export consortium, SMEs can significantly improve their export potential and reduce the costs and risks involved in penetrating foreign markets. Two specific types of export consortia can be distinguished: promotional consortia, which are created to explore specific export markets by sharing promotional and logistic costs among participating firms, and sales consortia, which not only perform business promotion activities but also handle the sales of member firms' products.²²

Hence, export consortia focus on improvement of product quality, collective decision making and marketing and buyer linkages. UNIDO provides extensive assistance in fostering the creation of export consortia in different industries. It places special emphasis on agri-business, institutional capacity building and policy advice on the regulatory and incentive framework (see Box 5.11), and acknowledges increasing demand for traditional products from their original regions (see Box 5.12 for an example).

International best practices in export consortia development are summarised in a practical manual which provides guidance related to the operation of export consortia (organizational structure, characteristics of member firms and optimal size of an export consortium), reviews the links of export consortia with private and public sector institutions and describes the main factors determining their success (UNIDO, 2003a).

Usually, export consortia development activities are undertaken within cluster programmes emphasizing the linkage aspect with smaller economic partners to contribute to the pro-poor growth agenda, or as specific projects targeting dynamic SMEs in growth-oriented sectors. Most export consortia are non-profit entities, and their members retain their financial, legal, managerial and commercial autonomy. Despite their participation in export consortia, member firms do not give up any control over their business to others. This is the main difference between consortia and other types of strategic alliances (UNIDO, 2009a).

²² Other distinctions can be drawn between single sector or multi-sector consortia; consortia that primarily comprise competitors or those that are primarily composed of firms with complementary goods and services; and consortia that target exports to a specific region or those that are active worldwide.

Box 5.11: Setting up a promotion consortium in Morocco

In 2004, UNIDO helped set up the Mosaic Promotional Consortium in Casablanca, Morocco, which ultimately consisted of six relatively large textile and garment manufacturers. All six companies sold nearly all of their production abroad, mainly to Europe. Their customers were considered quite similar because they all produced for large international retailers and brand names. Their products were highly complementary and the likelihood of any conflicts of interest in international markets was therefore very low.

The consortium's activities were subordinated to the autonomous strategic patterns of the individual firms. They did not consider the consortium as the main tool for their internationalization, but as a means to foster their individual competitive advantages in their markets (by improving their managerial competences and increasing and leveraging their strategic resources), of further developing exports and of extending and diversifying their trade opportunities (by new subcontracting and co-contracting activities).

For these reasons, the efforts (and investments) of the consortium were simultaneously oriented in two directions. Downstream, it created brand communication and marketing initiatives aimed at new prospects for their collective portfolio of products, for which the advantages of cooperating came from sharing the costs of producing promotional tools. This also included participation in international trade fairs and trade missions abroad.

Upstream, the consortium managed collective projects for the development of internal processes and systems of individual firms (for example, staff training in design, style and manufacturing processes, restructuring offices and departments, installing strategic information systems, guiding cost reduction programmes and collectively negotiating better conditions from suppliers of goods and services). Here, the additional advantage of the consortium for individual members was considered to lie in economies of scale, quicker and easier access to new external competences and collective access to public funds.

Four years after joining the consortium, the firms stated that their competences had improved (particularly their technical competences and their ability to analyse international markets) and that their relational capital had increased in terms of business contacts abroad. However, the main perceived benefit was the corporate image in the eyes of both customers and suppliers. Exports of member firms have, on average, increased by more than 30 per cent between 2004 and 2007, whereas exports from the Moroccan textile and garment industry as a whole increased by only 10 per cent in the same period.

A special case of export consortia is the cooperation of firms belonging to the same region, which try to market their products as a speciality from the specific region. In recent years, this type of cooperation has become particularly important in agro-industrial markets. This trend reveals a growing interest among consumers in traditional products that are closely linked to a specific place of origin and hence, are perceived as authentic and genuine. Customers in both developed and developing countries are willing to pay higher prices for “traditional products of regional origin”. For producers (mostly SMEs) that operate in the agro-industrial sector, this trend signifies a major opportunity, as it frees them from having to compete on price with standardized products in commodity markets and rewards them for maintaining biodiversity and cultural heritage in niche markets.

UNIDO acknowledges this trend and provides assistance for capacity building and value chain upgrading in relation to the use of geographic indication (GI). The concept of GI refers to an intellectual property right that is recognized by the legal bodies of various countries and international organizations. It identifies and protects products originating in a specific geographical area, whose characteristics and reputation are essentially linked to their territorial origin. UNIDO sheds light on the legal framework of GI and consults export consortia on registration and compliance (UNIDO, 2010a).

Box 5.12: Adding value to traditional products from Tunisia and Morocco

The “Projet d’accès aux marchés des produits agroalimentaires et de terroir” (PAMPAT) in Tunisia and Morocco, with funding from the State Secretariat for Economic Affairs (SECO) of the Swiss government was launched in 2013. The project aims to improve the performance, market access and socio-economic conditions of several value chains. In Tunisia, the project activities focus on harissa, the Djebba fig and the prickly pear, while in Morocco, argan oil and prickly pear value chains in the central Souss-Massa-Drâa region have been selected.

UNIDO is strengthening the organization and governance of the selected value chains, improving the productivity, quality compliance and product development of small-scale rural producers and enhancing their position in both domestic and export markets. UNIDO is also helping to ensure that the products comply with the requirements of recently introduced geographical indications and other quality labels in order to position them in higher niche markets and allow the producers to obtain a premium price and higher revenues. Through the implementation of new green technologies, the project will also improve the environmental sustainability of the value chains.

The project has been designed and is being implemented in close cooperation with local stakeholders, including the Ministries of Industry and Agriculture in Tunisia and Morocco. Special attention is being given to supporting young entrepreneurs, women and producers from disadvantaged regions. The traditional products are deeply rooted in local rural communities. By adding value along the entire value chain, the project offers promising prospects in terms of improving livelihoods, creating jobs and promoting sustainable and inclusive local economic development.

5.4. Exchange platforms and learning networks

Platforms and networks contribute to value chain development in different ways. By bringing necessary actors and stakeholders of the value chain together, they can foster the following outcomes:

1. Member firms engaged in similar businesses and production processes in the value chain can exchange knowledge and learn about best practices. They can also be put in contact with leading experts, innovators and international best practice firms.
2. Members of the platform can be recipients of pilot technology relevant for the value chain and become subject to capacity strengthening interventions.

3. The platform can provide periodic information on market, technology and other trends in the global value chain.
4. Member firms can find and build relationships with business partners in upstream and downstream segments of the value chain.
5. Stakeholders can develop common visions for the development of the value chain and formulate development actions of common interest to be implemented based on self-funding or other sources.

Like other development agencies, UNIDO recognizes the importance of exchange platforms and learning networks in the inclusive and sustainable development of industrial value chains. The range of platforms supported is wide, spanning from expert-based platforms like the “Leather Panel” to fora that bring together experts, private sector representatives and policymakers on a global scale such as the Green Industry Platform, which focuses on resource and energy efficiency. Some other UNIDO platforms and networks are, for example, the Industrial Knowledge Bank (IKB), Networks for Prosperity (N4P), global network for Resource Efficient and Cleaner Production (RECPnet) or the UNIDO-Hewlett-Packard Global Partnership Programme.

5.4.1. Leather and Leather Products Industry Panel

The UNIDO Leather and Leather Products Industry Panel (short: Leather Panel) is a global forum for technical assistance in the leather-based industry sector. It has formed a conference of mostly technical experts since 1977. Its objective is the provision of assessed information on good practices in small-scale manufacturing, professional training and pollution control in the leather, footwear and leather products industries to governments and institutes.

Members of the Leather Panel come from the private sector and governments; manufacturers and traders; education, training and R&D institutes; different sub-sectors (hides and skins supply, tanning, chemical suppliers, footwear and other leather products); national associations and regional federations (COTANCE, CEC), as well as from professional organizations (IULTCS, UITIC).

Since 2014, the Leather Panel has become web-based²³. The forum also prepares guidelines for institutions and actors in the leather value chain on, among others, the following topics:

- Grading of hides and skins by quality
- Quality standards in the leather and footwear industry
- Occupational safety and health (OSH) aspects of leather manufacture
- Treatment of pollutants in tannery effluent
- Selection of equipment for laboratories monitoring pollution in the tanning industry

²³ www.leatherpanel.org

- System for recovery and reuse of chromium from spent tanning liquor using magnesium oxide and sulphuric acid
- Costs of tannery waste treatment
- Life cycle assessment/carbon footprint of leather processing
- Footwear design and pattern engineering
- Assessing competitiveness in shoe manufacturing
- EU normative documents and legislation and their relevance for the tanning industry in developing countries
- Future trends and expected status of the world leather and leather products industry and trade (see, e.g. UNIDO, 2010b)
- Ongoing work includes the preparation of a proposal for CO₂ harmonization standards in the leather industry.

Box 5.13 provides an example of how this platform can be useful for value chain development in the developing country context.

Box 5.13: Reduction of environmental threats in the Bangladeshi leather industry

The project Re-Tie Bangladesh (Reduction of environmental threats and increase of exportability of Bangladeshi leather products) supported the industry in sustaining the conversion of locally available raw hides and skins into exportable products, either directly as genuine leather or as derived finished products. It was implemented by UNIDO and partners under the lead of the German institute SEQUA, with funding support from EU from 2010 to 2012, and drew on expert exchange within the Leather Panel on best practice approaches. The expected results of the project were the following:

- Increase efficiency in the use of natural resources and energy, and reduce environmental pollution and waste in the Bangladeshi leather sector;
- Improve OSH as well as CSR and other international standards to enhance the exportability of Bangladeshi leather products;
- Enhance a more supportive policy framework for cleaner production;
- Strengthen the institutional structure for the promotion of sustainable production in Bangladesh’s tannery/leather industry.

Leather processing has a long tradition in Bangladesh and is concentrated in the Hazaribagh districts of Dhaka City—in fact, almost all of the approximately 150 tanneries of the country are located in this fairly central area of the capital. Tanneries in Hazaribagh employ some 50,000 people and for each direct employment, about two indirect employment possibilities are generated. ▶

Due to cultural and related meat consumption conditions, a large amount of slaughtering takes place during the Eid-UI-Azha period (approximately two weeks). During this time, tanneries run at full capacity by processing 400 t/day of raw material that produces 21,600 /day of highly polluted effluent and 170 t/day of solid waste. Effluent is discharged directly to the Buriganga River, making its water completely unsuitable for any other use. The absence of adequate pollution control measures, wastewater treatment and rather poor working conditions is severely challenging this major source of employment and foreign revenues.

UNIDO's approach intended to prepare SMEs from the leather industry to produce ecology-friendly products, which are easier to export to Europe and fulfil requirements set by European importers in line with international environmental agreements.

The outlined goals were partly achieved by upgrading, both by introducing better technologies and improving the skills of the workforce via training. Specifically, water consumption was minimized and the utilization of chemicals optimized by implementing state-of-the-art process management. Waste water pollution from liming was minimized by introducing hair-save liming process technologies. For solid waste management, proposals for appropriate disposal were suggested and a solid waste guide for the tanning industry introduced.

Consequently, water consumption was reduced by 30 per cent, the chromium load in wastewater dropped by 15 per cent and COD in wastewater also fell by 15 per cent. The chrome uptake by pelt was also increased to over 85 per cent from 50-60 per cent.

Source: UNIDO Project (2010-2012)

5.4.2. Green Industry Platform

The objective of UNIDO's Green Industry Platform is the mainstreaming of social and environmental considerations into the operations of enterprises in all countries and regions through the more efficient use of energy and raw materials, innovative practices and applications of new green technologies. This allows for competitiveness gains through cost reduction and/or better compliance with international standards. UNIDO is well aware that decoupling economic growth from increased use of natural resources will require concerted efforts of government, business and civil society at an international level to rapidly scale up existing solutions. In this respect, the Green Industry Platform was designed as a global multi-stakeholder initiative, which fosters technical cooperation and research as well as the exchange of best practice solutions.

The platform offers the opportunity to secure concrete commitments and mobilize action in support of sustainable industrial models, and to engage in transformative partnerships that mainstream and scale up green policies and practices. Members of the Green Industry Platform (businesses, governments, international organizations, NGOs and research institutes) sign up to actively promote green industry policies and practices, like the improvement of resource efficiency, better waste management, reduction of toxic materials, energy efficiency and renewable energy, a lifetime approach to product manufacture, greening GVCs, green industry research and innovation, providing finance for green industries and job creation.

The Green Industry Platform was formally launched during the United Nations Conference on Sustainable Development in 2012 (also known as Rio+20) as a follow-up of the Green Industry Initiative developed three years earlier. This initiative provides a strategy for green economic growth, which does not come at the expense of social and ecological health. It supports enterprises to improve their resource productivity and environmental performance (greening of industry) and establishes new operations delivering environmental goods and services (creating green industries).

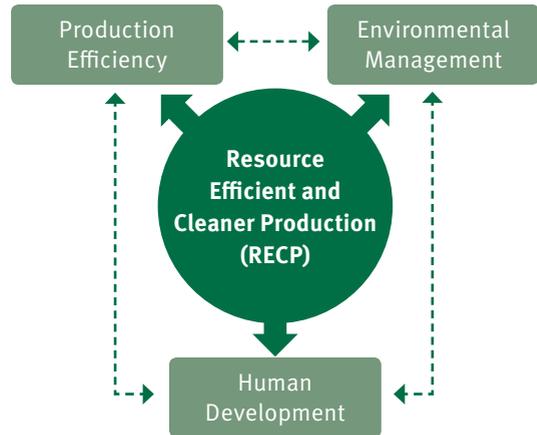


Figure 5.1: Resource efficiency and cleaner production

Source: UNIDO, 2013d, p. 9

UNIDO also furthers the green industry agenda through its joint work with the United Nations Environment Programme on Resource Efficient and Cleaner Production (RECP). As illustrated in Figure 5.1, RECP refers to the application of preventive environmental management practices in industrial products, processes and services with the triple aim of improving resource productivity, environmental management and human development. This requires an enabling framework under which UNIDO addresses policy and strategy, technology transfer, financial instruments and capacity building.

5.5. Greening of value chains

UNIDO is engaged in a diverse range of activities that support firms and industries to operate with higher degrees of resource efficiency and employ cleaner production processes. This can involve the cleaning up of industrial production sites, the application of water and energy saving technologies, the generation of (green) energy from energy crops, waste, wind, water and sun, the introduction of treatment, cleaning and filtering devices and of technology to avoid pollution, contamination and emissions. Many of these greening solutions target certain segments in the value chain. However, products and residues can move through various segments of the value chain, and issues of chain organization need to occasionally be resolved in order to achieve sustainable use of resources, energy and water as well as good waste management.

Government agencies can become drivers of “greening of value chains” by pushing for more environmental sustainability through the creation and enforcement of regulations and the provision of direct support to firms in their greening efforts. The main drivers, however, are ultimately those firms that decide to engage in greening their own operations or those of upstream or downstream business partners for regulatory, cost effectiveness or marketing/image reasons. The most interesting initiatives in greening value chains have recently been introduced in this last domain. Soft drink and beer producers provide examples for this (UNIDO, 2015a).

Initiatives to green value chains take different forms and can influence value chain development in different ways. Four major areas can be distinguished in this regard:

- 1. Provision of policy advice:** The aim here is to engage policymakers, decision makers in firms and other stakeholders in a dialogue to increase awareness of environmental issues concerning the value chain. Such dialogue should lead to the development and enforcement of laws and regulations as well as to the development of value chain “greening programmes” implemented by governments and the private sector.
- 2. Reports on greening potentials and suggestions for best-practice technology:** These are usually provided through sectoral studies conducted by multidisciplinary teams of experts in various fields of greening, mostly related to technology and operations management (see Box 5.14 for an example). Such reports are expected to serve as orientation guidelines for practitioners in their adoption of green industry policies and practices to improve environmental performance.
- 3. Identification of cleaner production and energy saving potentials in national value chains:** These are usually based on government or private sector requests and involve expert analysis at the local level. They are then usually followed by a “greening programme” which implements the suggested recommendations.
- 4. Enabling transfer and dissemination of cleaner and energy saving technology:** This can be achieved through projects and programmes implemented by governments and development agencies. The focus may lie on the introduction of pilots and demonstrations that animate other operators in the country to copy and introduce new technologies (see Box 5.15 for an example).

Box 5.14: Greening the Asian beef supply chain

In a recent analysis of the Asian meat industry, UNIDO reviewed best practices in greening opportunities for beef supply chains (UNIDO, 2013c). This chain includes feed and livestock production, meat processing, value added and by-products processing, transport and distribution and finally, domestic consumption. UNIDO found that the most significant environmental impacts generally occur during the livestock production stage with degradation seen due to greenhouse gas emissions; water extraction and use; land deterioration and biodiversity loss. These are arguably the most challenging to address due to their widespread nature. According to Thapa (2009), over half of the world’s 500 million small farms are found in China (193 million) and India (93 million) alone. Much of Asia’s cattle and buffalo population is distributed among these farms that support an integrated mix of crop, forage and livestock activities.

Intensification of livestock production undoubtedly exacerbates environmental impacts and has a profound effect on the social fabric of surrounding communities. Greening actions, therefore, need to take place across the board, taking account of environmental, social and economic impacts on communities and their surrounding areas. ▶

From a lifecycle perspective, beef livestock production contributes the greatest share of greenhouse gas emissions across the supply chain, mainly due to enteric emissions (methane) and nitrous oxides from manure. Overall, these activities contribute over 5 per cent of global anthropogenic emissions (MacLeod et al., 2012). Opportunities to reduce emissions from livestock include improved feed production and management, breeding methods and manure management. The efficient use of crop by-products and other innovative feed sources, such as urea-molasses-multi-nutrient blocks, would also help relieve the chronic shortage of feed in many regions of Asia. Innovative management techniques such as precision feeding and farming coupled with technologies such as portable near infrared reflectance spectroscopy (NIRS) and global positioning technologies (GPS) have vast potential to improve production efficiency, reduce resource use (energy, water, fertilizers) and minimize land degradation and water quality impacts.

Post-farming greening opportunities are potentially easier to manage, given that the impacts can be contributed to point source emissions of greenhouse gases, wastewater and solid waste. Technological solutions are available to address many of the post-farming impacts. In this respect, the issue is more about the use of appropriate technologies and the ability to continually access finance and training opportunities via capacity building programmes. There are significant opportunities for a closed-loop approach with respect to meat processing. The use of low carbon energy sources, such as biogas or manure, will not only reduce greenhouse gas emissions, but also help prevent nutrients from polluting water streams. Relatively simple measures, such as improvements in slaughterhouse design and dry cleaning methods, will also help separate potentially valuable or useful by-products, e.g. blood or paunch manure, and prevent them from entering waste streams.

Source: UNIDO, 2013c

Box 5.15: Sustainable handicraft production in Viet Nam

The handicraft industry as part of the homewares value chain was prioritized in the Government of Viet Nam's plan to foster economic development across all regions of the country, to reduce unemployment in rural areas and to increase exports. In this context, UNIDO developed a green growth strategy for the country's handicraft industry because the environmental sustainability of household-level production was weak due to the sheer number of actors and their general lack of knowledge on environmental techniques and practices. Consequently, a joint programme was developed, entitled "Green Production and Trade to Increase Income and Employment Opportunities for the Rural Poor"²⁴. The programme supported some 4,800 poor farming and craft-producing households and SMEs.

Bamboo, rattan, seagrass, silk, lacquerware, and handmade paper were identified as raw materials regularly used in handicraft production, and were considered an important part of Viet Nam's natural capital. Thus, a comprehensive and integrated approach was implemented to green and clean-up the entire value chain, starting from raw materials collection, processing, crafts production and transportation, right up to final markets. UNIDO applied RECP principles and methodologies, and ensured a systematic and holistic approach. Capacity building and technology transfer enabled handicraft producers to fundamentally change their operations. ►

²⁴ www.greentrade.org.vn

A further focus was put on vocational skills-based training and on the specific technology needs for lacquer processing, silk dyeing and bamboo treatment. Through international cooperation, new environmentally sound techniques were proposed and tested. Moreover, UNIDO assisted with the provision of appropriate tools and equipment in communities and enterprises. Additional support in business management and branding were provided.

As a result, hands-on guidance in cleaner production has contributed to new jobs and higher incomes for grassroot producers. With the concerted efforts and application of local and international knowledge, cleaner production techniques were made practical, applicable and cost effective for crafts-producing households and SMEs. Practical examples were developed for better product design, corresponding with the principles of sustainability, which proved to be attractive to the local market and international buyers. For sustainability-based branding and marketing, a practical assessment and labelling scheme was developed (UNIDO, 2013d).

Source: UNIDO, 2013d

5.6. GVC and social inclusion

One important dimension GVC integration needs to address to move closer to attaining ISID relates to its capacity to foster social inclusion. This typically implies a change in beneficiaries' participation in value chains by enhancing rewards and reducing exposure to risks in terms of finances, the environment, poverty reduction and gender equality. A key aspect of social inclusion relates to the engagement of women and youth in economic activities of the value chain resulting in income generation, job creation and poverty alleviation for more marginalized groups of the society.

One important point to bear in mind is that value chain development is never gender or youth neutral. Depending on the products manufactured and technologies applied as well as the resources and skills required, the involvement of women and the youth differs. Value chain development always alters the equilibrium of people currently engaged in the value chain.

Many countries have tremendous potential to expand their production through already existing manufacturing firms, thereby increasing incomes. They also usually have a vast potential of untapped human resources (the unemployed) that could be used for value addition to the production of, commodities and raw materials that are exported and not processed in the country of origin. Technical skills training and investment promotion in these industries are viable options for tackling the unemployment problem. Value chain development via the setting up of processing and value addition businesses can also lead to primary producers being able to find buyers for their products and thus earn higher incomes, a typical value chain effect.

The inclusion of women, the youth and vulnerable groups—an objective of many value chain development programmes—is not easy to achieve. Engaging in the race to become a competitive supplier in global value chains implies that winners who already have certain capacities and competitive advantages are picked. The chance that vulnerable groups actually belong to these

winners is fairly slim. Hence, additional far-reaching efforts in development programmes are typically required to assist and promote vulnerable groups to become successful business operators and to achieve the product quality and quantity global buyers demand.

The following figure schematically illustrates how this aspect can be tackled in the context of GVCs. It looks at two broad dimensions: job opportunities for the youth and women in the value chain (vertical axis) and skills and capacities of the youth and women (horizontal axis). As shown in the figure, an ideal situation is one in which the value chain already provides numerous job opportunities for these groups who have the necessary skills and capacities to benefit from them (upper right quadrant). However, this is frequently not the case. There are either plenty of job opportunities for these groups, but they do not possess the required skills (upper left quadrant) or the groups have the required skills, but the value chain does not offer enough opportunities (lower right quadrant). The worst case is when the value chain provides too few opportunities for these groups, who actually do not even have the necessary skills and capabilities to take advantage of those opportunities (lower left quadrant).

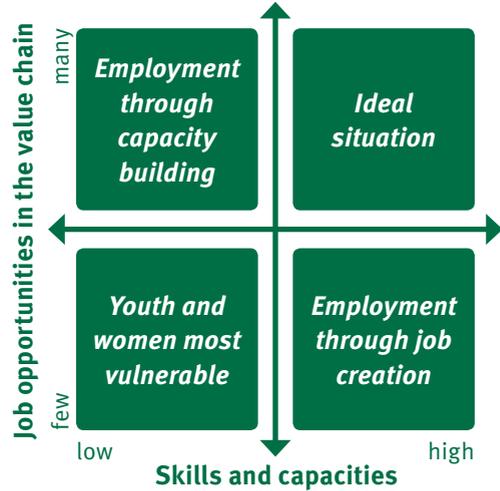


Figure 5.2 Mismatch between skills and jobs

Source: Own elaboration

UNIDO has extensive experience in targeting women and the youth through its projects, in many cases relating directly to value chain development. In this context, several entry points for job creation for youth and female workers through value chain development have been identified:

- Under certain conditions, the focus can be on developing value chains right from the start to specifically include the youth, women and other vulnerable groups and to help them find jobs and increase their incomes. This can be achieved by choosing a value chain that already engages or could engage many vulnerable groups, by supporting certain communities, producer groups and regions with high incidences of poverty, or indirectly by supporting market development and processing activities targeting the poor.
- The aim can be to create jobs in the value chain, which are directed at the youth or women. This can be achieved by providing technology and knowledge that matches the skills and profiles of specific youth and women groups. It can also involve the development of specific learning exercises.
- Emphasis can be placed on training the youth and women to match specific jobs in the value chain. This can be achieved through vocational training programmes, support to curricula development at educational institutions that target women and the youth in productive development, on-the-job skills development and through networks of joint learning.

- Finally, entrepreneurship development can be pursued, which supports the youth and women to become entrepreneurs in the value chain. Entrepreneurial development can be particularly important in the service provision functions of the value chain, private advisory services, transportation, industrial plant management, IT and accounting (see Box 5.16).

Box 5.16. Support for young entrepreneurs in Armenia

In Armenia, with the support of the Austrian government, UNIDO's "Productive Work for Youth" project successfully fostered youth-led enterprise creation and expansion with financial and non-financial services. In this project, a revolving fund set up by the Government of Armenia together with UNIDO provides access to loans for young entrepreneurs combined with intensive coaching, business services and technical assistance.

The main objective of the project is to contribute to systemic change, with both the public and private sector rendering more and better financial and non-financial support to youth-led enterprise creation and expansion. SMEs and young entrepreneurs are the most prolific in creating jobs and in innovating, therefore, it is strategically important for Armenia to develop its youth entrepreneurship activities.

In July 2015, a mid-term evaluation verified the project's success in terms of the tremendous local demand for the project's services, exceeding the targets of number of trainees (over 136 per cent) and loans granted (over 260 per cent), as well as its contribution to systemic change and catalytic effects based on high national commitment to institutionalize, replicate and upscale the project's approach.

Source: UNIDO, 2015c

The various dimensions reviewed in this chapter demonstrate that much good practice in value chain development support already exists. Such interventions take place in a wide array of areas, ranging from investment promotion, cluster development and export consortia to learning and exchange platforms and value chain greening. The examples provided illustrate the active engagement of UNIDO in all of these areas.

One limitation of many of these interventions relates to the fact that the approach used is often piecemeal and only targets certain aspects of value chain development, without contributing to a comprehensive value chain development strategy in an integrated manner. Moreover, a common practice in value chain intervention is that insufficient emphasis is typically placed on the dimensions of inclusiveness and environmental sustainability. These key aspects are still missing in common practice of value chain development. The next chapter will further elaborate this issue.

6. CONCLUSIONS

This report concludes by presenting the key findings from UNIDO's GVC work in the relevant areas of research, diagnostic tool development and technical cooperation projects, and offers a forward-looking perspective on the implications the rise of GVCs have for ISID and SDGs, and the way forward for UNIDO.

6.1. What has been learned?

This report has presented UNIDO's long experience working on global value chains in the specific context of ISID. It first introduced UNIDO's core activities in three related functions: research and policy advice, diagnostic tool development and technical cooperation projects. The primary objective of this report has focused on addressing two central questions: a) how do global value chains influence industrial development in less developed countries? and b) what strategies can countries adopt to integrate into global value chains in a way that promotes ISID? Against this backdrop, the report illustrates how UNIDO has positioned GVC activities within its mandate of ISID and Sustainable Development Goals, and has detailed the conceptual inroads used to analyse value chain development and its specific relation with industrial development. The report highlights the usefulness of the value chain approach as a framework to understand industrial development and design and implement policies and projects that focus on its sustainability and inclusiveness. However, it also reveals two common tendencies, namely declaring any type of industrial development action to relate to value chain development, and considering value chains to simply be streams of products when in fact they are complex (adaptive) systems with numerous elements and interactions. This is particularly problematic when it comes to value chain support measures. If such measures do not take the systemic nature of value chains into consideration, they risk remaining piecemeal and their chances of success will likely remain low. This study also emphasized that the strategic options available for developing countries are quite diverse and very much depend on industry-, chain- and firm-specific factors. Under certain conditions, functional upgrading may be necessary for sustained growth, although it requires a higher level of technological capabilities.

Findings from the rich and diverse body of UNIDO's positive and normative research were discussed to shed light on the dynamics of GVCs and the factors relevant for policy formulation. Positive research, has delved, among others, into the interdependence of world manufacturing production networks. The ways and pace of participation in GVCs differ by region and manufacturing industry. UNIDO work shows that ISID through GVCs needs to take factors into consideration that go beyond those that are usually considered for domestic arms-length transactions. These factors include the strategies of multinational corporations, governance structures shaped by foreign lead firms, levels of economic development and the institutions of the countries investors originate from as well as the volume of international demand and its growth potential. The mix of these factors in addition to host country and firm conditions can create opportunities for income and employment generation as well as environmentally safe production, which would then need to be further pursued through ISID-targeting policies and programmes.

The research findings of UNIDO and of GVC experts have laid the foundation of UNIDO's approach to value chain analysis, which is holistic in nature. In-depth (integrated) value chain analyses are an important step in value chain development and a key input for the design and implementation of value chain development support programmes with direct involvement of stakeholders. UNIDO's approach to value chain analysis builds on the understanding that value addition is a common principle in the chain, that actors who want to remain involved in the value chain need to reach a certain level of competitiveness, and that firms in the value chain are subject to structural change over time. This approach is compatible with ISID, though additional efforts need to be made to target inclusiveness and environmental issues. Tools such as pro-poor value chain development (UNIDO, IFAD and DIIS, 2011) and environmental hot spot analyses (Lietdke et al., 2010) can be extremely useful in this regard.

As shown in this report, value chain analysis fosters quality assurance in technical cooperation projects headed by the organization, which address different aspects of GVCs. UNIDO's technical cooperation features prominently in areas such as investment promotion, cluster development, export consortia, standards and quality compliance, learning and exchange platforms and value chain greening. Still, there is extensive room for improving integration among the various projects addressing different aspects of value chains and for creating synergies to achieve greater impact.

UNIDO has accumulated experience from upstream and downstream functions relevant to GVCs and industrial development. The following section considers the implications of the growing significance of GVCs for ISID and SDGs, and frames UNIDO's future path in this context.

6.2. SDGs, dynamics of GVCs and implications for ISID

The international community has embarked on a global mission to foster economic, social and sustainable development beyond the Millennium Development Goals. In the current context of growing global fragmentation of production, achieving these goals cannot be dissociated from a thorough analysis of how GVCs actually function. As briefly detailed in Chapter 2, GVCs connect different firms, industries and economies across borders and synchronize them in a way that the economic, social and environmental impact of production in one part of the world can be transmitted to many other parts through direct and indirect GVC linkages. Hence, successful participation in GVCs and through them in global industrial production and international trade can make important contributions to inclusive and sustainable development goals of countries and the international community.

UNIDO's vision of inclusive and sustainable industrial development is closely aligned to the 2030 Agenda for Sustainable Development, which sets out the global framework to eradicate poverty and achieve sustainable development by 2030. There are 17 new SDGs and 169 associated targets that integrate and balance the three dimensions of sustainable development, covering areas such as poverty, inequality, food security, health, sustainable consumption and production, growth, employment, infrastructure, sustainable management of natural resources, oceans, climate change, but also gender equality, peaceful and inclusive societies, access to justice and accountable institutions. ISID drives countries to reach as many of the SDG goals as possible and plays a central role in achieving Goal 9: to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Achieving many of the targets listed in SDG 9 requires countries to strengthen their capabilities both in terms of access (e.g. production opportunities, finance and markets) and upgrading potential (e.g. skills, technology, hard and soft infrastructure and institutions). Integration into GVCs can become a key driver in enhancing these capabilities. GVCs can provide windows of opportunities to gain access to international markets (both through direct trade and indirect production linkages) and increase industrial production. GVCs can also introduce advanced technologies in participating countries through foreign direct investments, often with business-specific infrastructure, hence providing upgrading opportunities in their production processes, products and functions.

Hence, successful participation in GVCs generates synergies between better opportunities for access and upgrading which, in turn, can make industrial development more inclusive and sustainable. Greater access to production and markets increases industries' demands and stimulates the entry of new firms. The expansion of industries will be facilitated by technological and managerial upgrading of firms including micro, small and medium enterprises, formalization of informal firms and skill development of both women and men for job opportunities. Production for foreign markets in GVCs in particular led by firms from advanced countries often comes with stricter requirements for environmental protection. Learning and complying with the requirements enhance business opportunities while making industries more sustainable.

Thus, access and upgrading through opportunities provided by GVCs can help industries move towards ISID and achieving SDG 9 and other related targets of SDGs. However, whether GVC integration can lead to sustainable industrial and economic development or not depends—among other things—on country-specific conditions, lead firms' strategies, the relative bargaining power between foreign and domestic actors and government policies in host countries. Reaping the benefits from GVC integration is especially challenging for firms in developing countries because they have limited resources and expertise to develop capabilities for better access and upgrading in GVCs. In such cases, it is also unlikely that firms outside GVCs can strengthen their production capabilities spontaneously and gradually start swarming into GVCs without any supporting policies. Firms in GVCs (especially those with captive and hierarchical governance structures as indicated in Chapter 3) could end up being locked into those tasks where transactions are strictly defined by prices and specifications and might therefore face limited incentives for learning and upgrading. In the absence of learning activities for upgrading outside GVCs, developing country supplier firms can continue to do more of the same without any improvements in productivity and quality, and might face eventual replacement by competitors in other countries that accumulate production capabilities faster. Industrial expansion through GVCs could also be interrupted if, whichever the stage of the value chain, firms outside the chains do not develop skills to produce inputs at an internationally acceptable level.

Empirical evidence indicates that technology transfers from foreign to national firms within GVCs (vertical effects) and from firms in GVCs to those outside (horizontal effects or spillovers) only take place under certain conditions, where usually a) transferors see the benefits in the technological development of their business partners, and b) transferees are capable enough to absorb new technologies. Although transferor's intention may not always have to be present, is a necessary condition. Foreign firms are more willing to transfer technology to their business

partners if they can be contractually tied and if both the internal and external conditions of the partners and business environment, respectively, are favourable. The internal conditions include the partners' proprietary asset, network and development potential. The external conditions refer to the attractiveness of political and macroeconomic stability, business regulations, infrastructure and the partner countries' human and natural resource endowments relative to others. Firms' absorptive capacity is a function of its skill and technological levels, managerial capability and production scale. Therefore, unless there are supportive conditions at firm, sector or economy-wide levels, GVC integration will hardly become a driver for better access to markets and upgrading through technology transfer. In such a case, the gap between a limited number of firms successfully integrated into a GVC and the rest of the economy could increase within-country inequality and hamper social inclusiveness, thus contravening ISID and SDG 9 goals.

GVC development should not be exclusively seen through the lens of trade facilitation (only focusing on global market access) or industrial capacity building (only concentrating on knowledge accumulation, technological upgrading and structural change). Successful involvement in GVCs requires looking in both dimensions simultaneously. However, better access and industrial upgrading often entail different policy measures and they are not always fully compatible. On the one hand, the essence of trade facilitation is to remove obstacles that prevent goods and services to freely move around the world in accordance with countries' comparative advantage to reach an optimal allocation of global resources. On the other hand, industrial upgrading is more long-term in nature, and its key objective is to upgrade a country's comparative advantages through a process of structural change.

Countries that are not internationally competitive in the industries or tasks of their current comparative advantage can probably not expect to improve their situations in GVCs much, even if they might manage to acquire new production skills and technologies. Thus, countries are more likely to benefit in the short term if they implement trade facilitation measures starting with those activities in which they have their current comparative advantages. While exploiting latent comparative advantage is important for realizing a country's current potential, at the same time, countries have to steadily expand their production potential so that they can increasingly undertake higher-valued and technologically more sophisticated tasks in a longer horizon. However, it is a formidable challenge to simultaneously succeed in both the exploitation of current comparative advantage through greater access to global markets and the creation of an enabling environment for sustained expansion of production capabilities. Not only the extent of learning and development efforts involved in such a task is enormous, but also the policy space of national governments to support it is limited in the context of GVCs. Thus, to make GVCs work towards ISID and SDG 9, support from international organizations like UNIDO can play a key role in complementing the efforts of national governments, development institutions and local as well as multinational firms.

To this end, as discussed in this report, UNIDO's tools and technical cooperation have taken a holistic view towards successful participation in GVCs and apply various measures which help address different constraints associated with GVCs. UNIDO's Structural Change Industrial Diagnosis Approach helps countries identify where their current comparative advantages lie and in which industries or tasks they are likely to gain advantages in the future as countries increase their GDP per capita. While most of our projects address multiple areas of GVCs,

UNIDO's trade capacity building (section 5.1), investment promotion (section 5.2) and clusters and export consortia development projects (section 5.3) often provide expertise to narrow technical and information gaps and to reveal and realize a country's potential through greater access to production and market opportunities. For the improvements of production capabilities and structural change, UNIDO's technical cooperation projects related in particular to cluster development (section 5.3), exchange platforms and learning networks (see 5.4), and value chain greening (see section 5.5) engage with stakeholders to help countries build capabilities for technological upgrading in GVCs and successful participation in GVCs.

6.3. The way forward: Creating synergies within UNIDO and with other organizations to make GVCs work for ISID and SDG 9

Countries face tremendous challenges in their efforts to make integration into GVCs a suitable means for achieving ISID and SDG 9 due to the geographical boundary of national policy in the context of international production networks, asymmetry in bargaining powers among GVC participants and the necessary balance and coordination in the implementation of different policy measures (e.g. trade, industry and competition), which may not be always compatible. UNIDO has a long history of conducting research, policy advice and technical cooperation in the field of global value chains. To further align UNIDO's projects with its mandate, ISID-specific approaches have to be developed in each area of our support services.

Given the increased use of GVCs as modes of production and trade and the opportunities and challenges GVCs present to developing countries, the creation of greater synergies within UNIDO's work and with other organizations has become ever more crucial for promoting ISID and SDG 9. The expansion of research networks and cooperation with other international organizations and academia enable us to have access to necessary databases, cover different GVC-related topics and increase the geographical coverage of our research. Scaling-up of the research work will enrich the quantity and quality of UNIDO's evidence-based policy advisory services, which can strengthen policy coordination in collaboration with other organizations.

Research work and policy advisory services have laid the theoretical and empirical foundation for the development of diagnostic tools that are applied across technical cooperation projects for quality assurance. Predicated on research findings and the application of diagnostic tools, UNIDO's project interventions can focus on removing binding constraints to spark sustained development. The effectiveness of such technical cooperation projects could be further improved by strengthening the synergies between different branches in UNIDO and with other organizations, as project formulation for better access and upgrading in GVCs requires a shared understanding of the general picture and of the challenges to be tackled, along with countries' development objectives. Hence, cooperation with professionals and organizations addressing different aspects of GVC development is crucial. The lessons learned from technical cooperation projects can indicate areas of further research and provide feedback for the refinement and development of diagnostic tools. This cycle of interaction within UNIDO and continuous dialogue and cooperation with other organizations helps expand the scale and scope of UNIDO's impact by supporting ISID and SDG 9 through GVC integration.

To move in this direction, various cooperation and joint projects with international organizations and universities are currently being planned. At present, UNIDO is discussing possible collaboration efforts with the WTO to improve the availability and quality of data for GVC analysis, and with the World Bank to investigate the determinants of linkages between local firms and foreign investors and the crucial factors that maximize the potential benefits for domestic firms stemming from GVC integration.

In a recent summit organized jointly with the WTO, the Ministry of Commerce of China and the Shenzhen Municipal People's Government²⁵, key players from these and other organizations discussed possible avenues of cooperation to build bridges between the business community, researchers and policymakers, with the objective of identifying policies geared towards promoting inclusive growth through production, trade, investment and innovation.

In a similar vein, UNIDO has recently launched a joint project with the University of International Business and Economics (UIBE) of Beijing, China, aimed at examining the existing links between GVC integration and the SDGs, in particular, SDG 9, analysing China's and other Asian countries' experiences with integrating into GVCs. UNIDO has also recently developed a joint research project with the Kiel Institute for World Economy (IFW-Kiel) of Germany, the African Centre for Economic Transformation (ACET) of Ghana and the Stellenbosch University of South Africa to investigate the expansion of global supply chains and accompanying CSR practices, and how they can foster or prevent inclusive and sustainable development in Africa. These initiatives will enhance and complement the current GVC projects UNIDO is working on with other international organizations, including, for example, the above mentioned Inter-Agency Group on Value Chain Development (which includes FAO, ICT, ILO, UNCTAD, UNDP, UNIDO and WFP) and the Accelerated Agribusiness and Agro-industries Development Initiative (3ADI) together with AfDB, FAO and IFAD, which aims to enhance the productivity and profitability of agribusinesses in close collaboration with stakeholders by designing and validating concrete interventions that promote value-addition in agro-processing, post-harvest handling, supply chain management and trade promotion.

²⁵ 2015 Global Value Chain Innovation Development Summit, 15 to 16 October 2015, Shenzhen, China.

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