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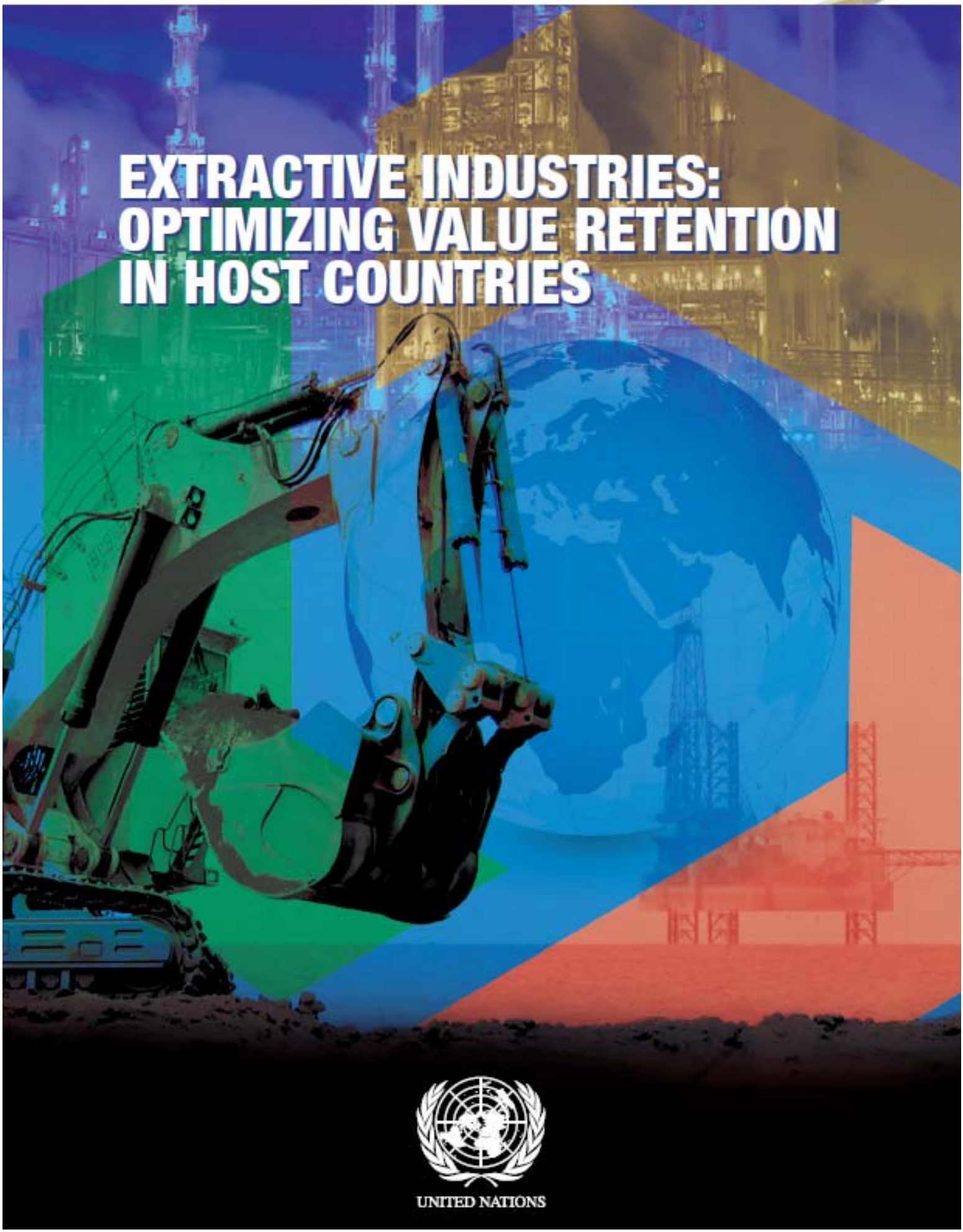
EXTRACTIVE INDUSTRIES: OPTIMIZING VALUE RETENTION IN HOST COUNTRIES



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EXTRACTIVE INDUSTRIES:

OPTIMIZING VALUE RETENTION IN HOST COUNTRIES

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Note

The purpose of this document is to analyse and to stimulate the discussion in the area of natural resources management in developing countries. It has been prepared in the framework of the 15th African Oil, Gas and Minerals Trade and Finance Conference (OILGASMINE), Congo 2012, and the Special Event entitled *"Natural Gas as an engine of growth"*, during UNCTAD XIII, Qatar 2012.

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Contents

Introduction

In 2010, 6 out of the 10 largest companies in terms of revenues were from the energy and mining sectors. These companies have enjoyed record profits over the past few years, fuelled by significant and sustained rise in commodity prices. Paradoxically, in developing countries where these extractions occur, the majority of the people still remain in poverty. This asymmetric distribution of benefits arising from economic activity created by the extractive industry suggest that the industry operates as an enclave in the host country with limited linkages to the broader economy. This gap between the profits of operating companies and local economic benefits is likely to widen if resource owners do not put appropriate policies in place to capture and retain value created from the industry.

Minerals and hydrocarbons are finite resources. Developing countries rich in these resources are therefore seeking for strategies to harness the opportunities created with the extractive industries to support sustainable economic development. One such strategy is by setting local content rules[1] that will foster the development of an industrial and manufacturing capacity in host countries. In order for this new capacity to be sustainable, it should be competitive vis a vis the foreign suppliers of goods and services otherwise, it will also fade away when the resources run out. The local content regulations should therefore contribute to enhancing competitiveness and ensure forward, backward and horizontal linkages are created with the rest of the local economy.

Local content in economic development presents many challenges for public policy makers and companies. It involves developing appropriate regulations and frameworks that will optimize national value creation from their extractive industries - by stimulating employment and entrepreneurship, value-addition, diversification, transfer of technology and knowledge creation, and requires understanding the extractive industry value chain and its economics. It is equally important to review the challenges and the impacts (positive and negative) of the extractive industries in host countries so that lessons can be learned. Several developing countries have adopted successful approaches to local content regulations which could be followed by interested resource rich low income countries.

This paper examines ways in which local content in the extractive industries can be addressed.. In this respect, the paper is divided in five parts. Part 1 describes the structure of the oil and gas and mining industries, including a discussion of the margins in the oil value chain as well as the stakeholders. Part 2 explains the positive and negative impacts of natural resources exploitation in host countries. Part 3 identifies the main challenges that developing countries face in optimizing value retention and examines ways in which they can be addressed. Part 4 presents three different country experiences of local industry development strategies in the extractive industries. The paper concludes with some policy implications and conclusions with regards to local content development strategies.

[1] Local content is defined as the total value added to, or created in the local economy through the utilization of local human and material resources and services at all stages of the value chain.

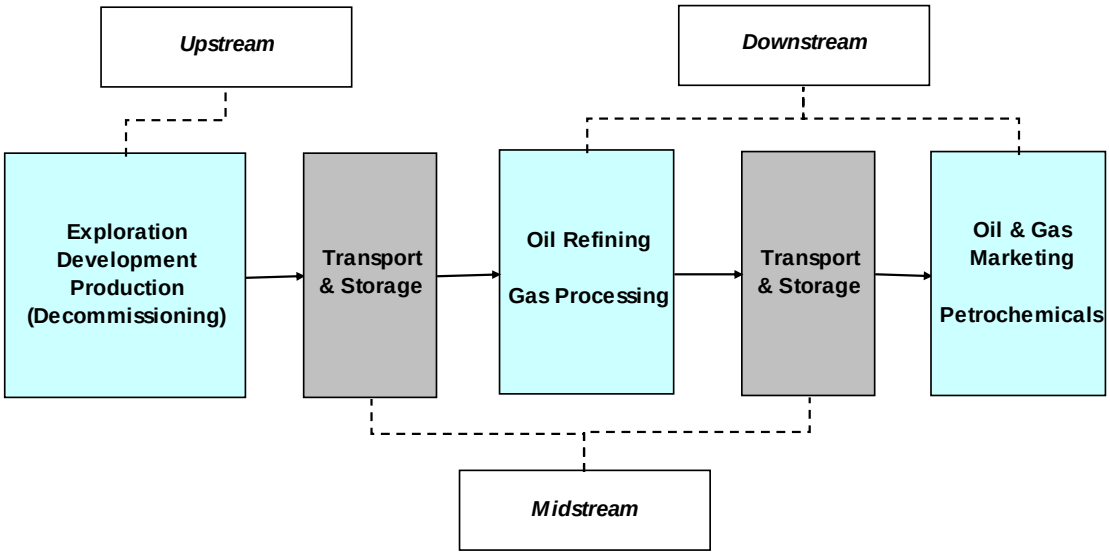
1 Structure of the extractive industries[2]

Extractive industry can be defined as a processes that involve different activities that lead to the extraction of raw materials from the earth (such as oil, metals, mineral and aggregates), processing and utilization by consumers. These processes take place within host countries and home countries of operating companies, as well as consuming markets. The resulting global value chains as well as the value distribution along the production chain and the stakeholders can be impacted by local content policies which are increasingly becoming a strategic factor in investment decisions and the formulation of public policy for industrial development. Understanding these impacts require looking at the structure of the extractive industries (oil, gas and mining) which comprise activities ranging from exploration to selling to end consumers.

1.1 Oil and gas industry structure

The activities in the oil and gas industry are grouped into three main segments: upstream, midstream and downstream. Upstream comprises exploration, development and production; midstream covers transportation and storage; and downstream includes manufacturing of products through oil refining, gas processing and petrochemical processes, as well as the selling of these products to the various consumer markets.

Figure 1.1. **Oil and gas industry structure**



Source: UNCTAD.

Upstream activities start with *exploration* stage that comprises the activities of finding oil and gas and assessing its quantity for possible exploitation. The exploration and appraisal process may take three to ten years to complete. After exploration, if the results and appraisals indicate that commercial production is viable, the *development* stage is carried out. It includes all the activities and investments needed to prepare the site for commercial production: roads, the production wells, platforms, production installation, processing and metering equipment, etc. This stage can take from two to four years depending on the particularities of the project and the region. Likewise, development investments could amount to 40%-50% of the total

[2] For further details on Oil and Gas and Mineral activities see APPENDIX I.

cost of a project and varies considerably from one region to another, depending on the depth of the objective; the quality of the reservoir and the products (density, viscosity, etc.); and the geographical environment (onshore or offshore). [3]

The development stage is followed by the *production* stage, which comprises all the activities of commercial extraction of oil and gas from the deposit. The production costs vary depending on the ease of extraction, the size of the field, the geographical situation (on-offshore) and the region. After a period of production of 15-25 years, the limits of economical recovery of the hydrocarbons are generally reached and the production structure is dismantled to rehabilitate the area. When commercial exploitation ends, the *decommissioning* of production installations starts, which involves the removal of buildings and equipment, the restoration of the site to environmentally-sound conditions, the implementation of measures to encourage site re-vegetation, and the continued monitoring of the site after closure.

The midstream sector is composed of assets and services that provide a link between the supply side and demand side of the value chain, and include the activities of *storage* and *transportation* of oil, natural gas and processed products.

The downstream sector covers the activities ranging from the refining/processing of hydrocarbons to selling to final consumers. *Oil refining* is the process in which hydrocarbon molecules are separated and crude oil is converted into finished products for consumption. Likewise, the *processing of natural gas* consists of separating the various hydrocarbons and fluids from the wellhead gas. After refining and processing, oil products marketing includes the activities necessary to sell and deliver refined products to end consumers through wholesale, direct industrial sales and retail in petrol stations.

Oil refining and natural gas processing provides the raw material for the *petrochemical industry*. The petrochemical industry requires certain minimum plant dimensions to achieve economies of scale, and the volume available is a key element to establish a petrochemical industry based on natural gas production.

1.2 Mining industry structure

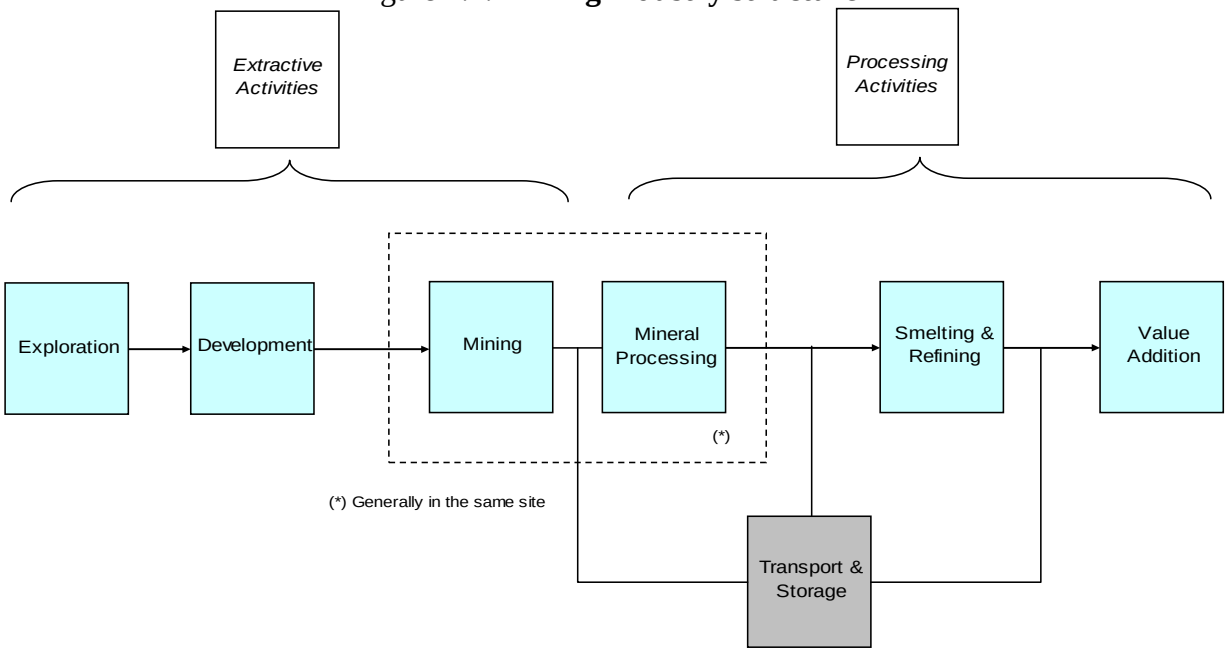
Mining industry structure has similarities with hydrocarbons structure. The main activities in the mining process can be classified into extractive related, which involves exploration, development and mining; processing related, which encompass processing or beneficiation,[4] smelting and refining, other added value activities; and transport and storage (See Fig 1.2).[5]

[3] Source: Institut Français du Pétrole (IFP). Petroleum Economics and Management training material 2007. See Appendix I - Figure I from which other data of this section were obtained.

[4] Mineral processing is usually presented as part of the mining activity, as these facilities are generally located close to the mine.

[5] Although alluvial mining is also a relevant production activity, especially in artisanal and small scale production of diamonds and gold, most of the mining resources are exploited as described in Fig.1.2 .

Figure 1.2. **Mining industry structure**



Source: UNCTAD.

Among the extractive related activities, *exploration* represents the first stage in mining. It includes all the activities leading to the discovery of resources. The total cost of exploration stage may vary from $20 million to over $150 million, and it can take 3-10 years before feasibility decisions are made. If it appears likely that exploitation is possible, the *development* stage follows with the preparation of a feasibility study and the construction of the mine. The development includes the building of the mine, the processing plant, roads, rails, sewer and water lines, and housing to support the operation. The construction phase requires the largest amounts of investment –it can range from $100 million to $3 billion – and can take 2-4 years. The *mining* stage starts with the commercial exploitation of the mine and consists in the removal of the mineral value in ore from the host rock or matrix. Mining can be classified in two types or extraction methods: surface mining (open pit or open cast) and underground mining. While the choice of method depends on the size, shape and depth of the ore body, all operations involve the basic steps of ore breaking, loading and hauling to a mill for treatment. When commercial activity reach to an end *decommissioning* and *mine closure* activities must be carried out. The time needed to shut a mine varies from two to five years; normally, the bigger and more complex the operation, the longer it takes to close. [6]

After mining, processing related activities start with the *mineral processing* or *beneficiation* stage, which involves the activities to separate the mineral from waste material, remove impurities, or prepare the ores for further refinement. This beneficiation process is usually completed at the mine and its purpose is to yield a product that has a much higher content of valued material (concentrates). Following beneficiation, the concentrates are shipped to *smelters or refineries* to further extract and/or refine the metal, thus preparing it for its final use or for incorporation into physical or chemical manufacturing. Finally, the *value addition* activities include the metal working industries that process pure metals, forming it into commercially traded shapes such as ingots or cathodes.

As mineral deposits can be located in remote places, *transport and storage* activities play a mayor role in carrying the minerals from one stage of the value chain to another.

[6] From http://www.miningguide.ca/ - Accessed in January 2012

Transportation of ore and concentrates can be done by sea, rail and road. Besides location, transportation decision is also dependent on the mineral characteristics. Storage is necessary at several points in the mining supply chain. Because minerals are transported mainly in batches (e.g. a unit train or a vessel), the supply chain must accommodate surges and lulls in demand at the mine; at the origin and receipt dock or port for water shipment; and at the end user, such as a power plant in the case of coal.

1.3 Oil and gas and mining industry main actors

Within this structure, the functioning of extractive industries throughout the value chains requires the involvement of various stakeholders which include companies (private and public), government agencies, civil society organizations and the local communities. Private companies are mainly fully integrated (or major companies), independent producers or junior mining companies, independent refiners, pipeline companies, service providers, transport, storage and trading companies. Likewise, State-owned companies and local indigenous companies can be fully integrated or participate in some of the value chain stages.[7] These stakeholders[8] have various expectations depending on their interests, positions, alliances, and importance related to a local content policy which is increasingly becoming a strategic factor in investment decisions, project delivery and the formulation of public policy for industrial development.

A local content regulation may have commercial implications for investors, operators, developers and service providers, which in turn may result into substantive public policy repercussions. For example, such regulation may lead to a reduction in national revenues or disincentive to inward investment. At the same time, by stimulating local procurement and employment, the regulation will have a direct impact on the cost effectiveness, reliability and sustainability of the mining operations.[9] Policymakers' expectations from a local content policy include enhanced local capabilities to supply good and services to the extractive industries and other industries, transfer of technology and know-how, stronger institutions, and private infrastructure that also provides a public service. Obtaining and maintaining social license to operate is essential. Mining companies need community support to mitigate social impacts and minimize business risks, hence is ultimately beneficial to all the stakeholders. The challenge for investors, regulators and local communities is therefore to know before the design and crafting, which regulations will have precisely what degree of impact, and on whose strategic interests.

Other important stakeholders in the extractive industries sector include:

- **Financial institutions (national, regional and international)** that provide resources and services which are essential for the well functioning of the extractive industries. This include: Governments, investment institutions (e.g. EXIM Bank), and insurance companies;
- **Commodity exchanges,** that facilitate price discovery and provide hedging functions and increase liquidity;

[7] A good example of local private sector participating in the extractive industries and whose performance is perceived as a raw model in Africa is the OANDO group in Nigeria.

[8] A mapping of each stakeholder is included in Annex I. Actors and participants by stage and activity in the oil and gas and mining value chains.

[9] In other words, mining companies may enjoy a more secure and customized supply which will help reduced lead times, stock holding costs, and an enhanced public perception.

- **Trade and professional organizations** support the industry and its employees. Trade organizations collect industry data, hold seminars, and advocate public policies beneficial to the industry. Professional organizations are focused on the industry's core technical skills.

1.4 Oil and mining value chain economics – Distribution of the margin along the value chain

Generating profits in the upstream business is achieved only through the discovery and extraction of hydrocarbons reserves. However, for a discovery to be considered "commercial" by the investor, the anticipated cash flow must provide a return on investment, after paying all royalties, taxes and other charges to the host government, and servicing capital and interest. As a general rule, the main factors that determine a commercial discovery are the quality of the hydrocarbons, the amount discovered, the location of the reservoir and its proximity to consumer markets. The upstream sector requires the highest amount of investments in the value chain, and yields the highest profits.

In the downstream sector, oil refining is a both capital-intensive and a highly volatile business. The profitability measure is the refining gross margin (value of products sold minus the cost of crude) which is sensitive to marginal changes in international prices for oil and oil products. Since prices are beyond their control, refiners have to manage their profitability by improving feedstocks, optimizing product slate and reducing operating expenses. The main elements that determine the profitability of a refinery are: location, size and configuration. The location determines its access to oil sources and products markets; the size decides the possibility to take advantage of economies of scale; and the configuration or complexity is the ability for a refinery to process different kinds of crudes and transform them into higher value products. With a higher complexity (a wider mix of technological processes), refineries can achieve higher margins. In marketing, margins are generally lower but more stable than in refining; however, the competition in this segment of the value chain is fierce.

In the case of the midstream sector, as it connects different activities of the value chain, market events that can affect crude oil, natural gas, petrochemicals or refined products sectors can profoundly influence the performance and profitability of a midstream business. Margins are generally lower than in the other two segments of the value chain.

As an example, Table 1.1 provides a detailed breakdown on the value and margins through the hydrocarbon value chain based on the price of gasoline in the United States.[10]

Table 1.1 **Pump price of gasoline in United States ($/bbl)**

Operation	Costs	Value	Net Margin	Percent
Exploration	2.97	16.33	13.36	36%
Production	17.78	49.00	14.89	41%
Transportation	1.00	51.96	1.96	5%
Refining	3.70	60.46	4.8	13%
Distribution	1.90	63.69	1.33	4%
Marketing	0.80	64.85	0.36	1%
Pump Taxes	19.15	84.00	0	0%
	47.30		36.7	100%

Source: Petrostrategies 2011.

[10] The table assumes a crude oil price of $49/bbl and an average pump price of $2.00/gallon. Petrostrategies 2011.

The table shows that much of the total value chain margin, 77%, is concentrated in upstream activities (exploration and production), while downstream (refining and marketing) and midstream (transportation and distribution) activities only account for 14% and 9%, respectively.

In the mining sector, how progressive stages of value addition can enhance revenue generation is illustrated by the following example presented by the Chairman of EXIM Bank of India in Q3 2006. [11] Iron ore average export price was around $50–$70 per MT[12]. If the same iron ore was converted into downstream steel products, the export price became phenomenal. Round steel products (construction steel) sold for $550 plus per MT, hot rolled coils sold for $550 per MT, cold rolled coils sold for $625 per MT and galvanized and coloured steel sold for $700 per MT. Thus, resource rich countries lost out terribly in the bargain. A 1.5 million MT of steel plant could be set up at a project cost of $1.5 billion which could generate export revenues of around $800 million per year. With a profit margin of around 25%, the payback period for the project is around seven to eight years. In addition, such a manufacturing venture creates a large pool of skilled workforce and spins off number of ancillary and supporting industries as well.

The structure of the extractive industries value chain just examined in this chapter presents opportunities for commodity-dependent developing countries to use their mineral endowment as the basis for broad based development. It however present some challenges and opportunities which can be apprehended through the impact (positive and negative) of the natural resources sector exploitation and management at the economic, environment and social levels.

[11] From Issues in Promoting Local Content in Africa's Extractive Industries. T.C. Venkat Subramanian. Chairman and Managing DirectorExport-Import Bank of India, Mumbai. www.eximbankindia.com/speech.pdf
[12] Iron ore average price in 2011 plugged along $150–$170 per metric ton.

2 Impact of extractive industries on economic, environmental and social development

Extractive industries are an important wealth creating instrument for developing countries. For some natural resource rich countries it accounts for over 50% of GDP. However, the full range of benefits that can accrue to the resource owner has been limited because of a variety of factors including the enclave nature of the industry and the capital intensive requirements for developing the industry. The extents of the positive and negative impacts are context specific and vary from extractive activity, location, economic environment and quality of governance. These impacts can be influenced at any level of the value chain by the local content policies adopted in host countries. Likewise, apprehending these impacts and their dynamics are of critical importance in the design of appropriate regulations. For the purpose of analysis, extractive industries impacts are grouped in: economic, environmental and social impacts.

2.1 Economic impacts

The main economic impacts of extractive industries are reflected on: the macroeconomic performance, the government revenues, the direct employment, and in the economic externalities and spill over effects on other sectors of the economy.

2.1.1 Macroeconomic performance

Extractive industries exports are a valuable source of foreign exchange in host countries. These resources finance imports of goods and services needed for industrialization, diversification and growth. Capital inflows from the development stage of projects and revenues from operations have a positive impact in the country's balance of payments.

However, if these inflows are not well managed, especially when there is a dominance of a natural resource in an economy, they may harm economic performance. In these cases, extractive industries can be a source of macroeconomic instability and distortions, commonly referred to as the "Dutch disease".[13] Volatility in the price of commodities is also a major concern for countries that are heavily reliant on extractive industries exports, as recurrent booms and busts in commodities prices tend to affect the stability of the exchange rate, the local industry activity and even the government finances. As seen in Table 2.1, exports dependency on minerals can reach almost 98% of total exports in some developing countries.

Experience in some natural resources-rich countries such as Norway, Chile and Indonesia have shown that negative macroeconomic effects can be diminished with the creation of sovereign wealth funds,[14] the application of realistic exchange rates policies, prudent fiscal policy and persistent initiatives towards diversification.

[13] The term "Dutch disease" originated in the Netherlands during the 1960s, when revenues generated by natural gas discovery led to an appreciation of the national currency and to a sharp decline in the competitiveness of the non-booming tradable sector.

[14] Pools of money derived from a country's reserves, which are set aside for investment purposes that will benefit the country's economy and citizens. The funding for a sovereign wealth fund (SWF) comes from central bank reserves that accumulate as a result of budget and trade surpluses, and even from revenue generated from the exports of natural resources.

Table 2 1: **Developing and transition economies with highest dependency on exports of minerals (Per cent of total exports, 5-year average (2000-2004))**

Sorted by fuels [a]			Sorted by non fuel minerals [a]		
Economy	Fuels	Product description	Economy	Ores and metals	Product description
Algeria	97.8	Oil and gas	Guinea [bc]	89.8	Bauxite, alumina, gold and diamonds
Nigeria [b]	97.8	Oil	Botswana [d]	87.2	Diamonds, copper, nickel
Libyan Arab Jamahiriya [e]	96.9	Oil	Suriname [b]	70.0	Alumina (aluminium oxide)
Yemen	93.3	Oil and gas	Zambia [b]	61.5	Copper, cobalt
Kuwait [b]	92.9	Oil	Jamaica	60.8	Alumina, bauxite
Angola [f]	92.2	Oil	Niger [b]	46.1	Uranium and gold
Qatar	89.1	Oil, petrochemicals	Chile	45.0	Copper
Saudi Arabia [b]	88.9	Oil	Mozambique [b]	42.3	Aluminium
Brunei Darussalam [b]	88.3	Oil	Papua New Guinea [b]	38.6	Gold, copper
Azerbaijan	86.6	Oil	Congo Republic [g]	34.0	Various metals
Iran, Islamic Rep. of [b]	86.3	Oil and gas	Ghana [h]	33.3	Gold
Venezuela	83.4	Oil	Cuba	33.2	Nickel
Turkmenistan	81.0	Gas	Peru	32.9	Gold, copper, zinc
Oman	80.6	Oil	Rwanda [bi]	32.2	Various metals
Gabon	79.5	Oil	Uzbekistan	30.3	Gold
Sudan [b]	74.2	Oil	Georgia	24.9	Various metals
Syrian Arab Republic	72.8	Oil	South Africa [c]	21.7	Platinium, gold
Bahrain	70.5	Oil	Bolivia	19.1	Zinc, gold
Trinidad and Tobago [b]	61.3	Oil and gas	Kazakhstan	18.0	Various metals
Kazakhstan	56.1	Oil and gas	Bahrain	16.8	Aluminium

Note: Venezuela stands for Bolivarian Republic of Venezuela

Source: UNCTAD 2007.

2.1.2 Government revenues

Extractive industries may raise government revenues mainly through: direct ownership (with State-owned companies or joint ventures), taxation (corporate income, value added, and other specific taxes) and royalties and/or payments under contractual arrangements (like concessions or production share agreements in the oil industry).

In many countries, extractive industries represent an important part of annual government revenues, as it is the case of oil in Nigeria with 74% in 2010.[15] These revenues have a positive impact as a source to finance public infrastructures, human capital investments (education, health) or to support the development of other economic sectors. But at the same time, an excessive dependence can also have negative and destabilizing effects on fiscal budgets, as prices volatility is directly mirrored in government cash inflows. In the case of Chile, two main policies have had good results in stabilizing government expenses: (i) the budget structural balance rule[16] and (ii) the creation of reserve funds.[17]

In terms of revenues from taxation, most tax regimes applied in the sector are based on taxing profits, which implies that companies are not required to pay taxes when they incur looses.[18] This raises the problem for developing countries on how to assess the level of profit declared by the companies, as some countries experience shows that through the utilization of questionable accounting practices, firms can undervalue their profits in order to reduce tax payments for several years. The utilization of transfer pricing, which is defined as the price charged for tangible and intangible assets, services and financial instruments sold or

[15] Central Bank of Nigeria

[16] Structural balance reflects the medium-term fiscal outlook, which involves estimating the fiscal income that would be obtained net of the impact of the economic cycle, and spending only the amount that would be compatible with this level of income. In practice, this means saving during economic highs, when revenues known to be of only a temporary nature are received, and spending the revenues in situations when fiscal income drops

[17] In Chile, in order to manage the windfall revenues from copper prudently, the government created two "sovereign wealth funds" in 2006 and put the central bank in charge of managing them.

[18] Some regimes also include accelerated depreciation of assets or even forward loss clauses that allow carry forward the losses to minimize future tax burden.

transferred across borders by multinational companies to their affiliates, is also used as a way to reduce taxable profits locally to transfer them to foreign subsidiaries in other countries with lower tax burden. Government tax regimes and regulations should prevent these risks, in order to ensure more predictability in their revenues. Tax regimes that consider the combination of profit taxation with royalties (based on volume and not on profits) and strict accounting controls are advisable for this purpose. [19]

For transnational companies in the commodities industry, the vertical integration of various stages of the production process is often the preferred mode of trade, which has been developed in response to particular characteristics (or risks) of the natural resource industry, like the fluctuation in profits of the different stages, uncertainty in access to resources, high sunk costs associate with locations and the distance between producing and consuming markets. This results in a notably wide geographical distribution of the value chain which become global as it is commonly divided among multiple firms and spread across various countries. Considering the increasingly importance of this "global value chains" in the extractive industries, the advent of transfer pricing rules and regulations around the world represent a significant financial issue that has broad implications for today's global extractive industry companies – requiring them to think globally so that transfer pricing is managed properly across the enterprise, and act locally to be in compliance with a myriad of different tax laws.

Therefore, the diversification of the economy to expand the tax base, clear tax rules and a prudent fiscal management through a balanced budget are required to avoid the negative impacts of dependence of governments' revenues on extractive industries.

2.1.3 Employment

In general, extractive industries are capital intensive and make a limited direct contribution to employment. For example, the mining sector employs 22 million to 25 million people worldwide (approximately 1% of the total global force[20]), and in some mining countries like Botswana, Chile and Peru that percentage varies from 3% to 0.7% of the local work force. Similarly, the contribution of the oil and gas industry to the national employment is also small, 1.5% of the working population in Saudi Arabia and 4% in Equatorial Guinea.[21]

In terms of occupations, the following table shows the professionals required along the oil and gas value chain, separated in primary technical job title, operational and support position, which shows a high degree of specialization, even for operational jobs.

Table 2.2: **Professionals required in the Oil and Gas industry**

PROFESSIONAL REQUIRED	Exploration	Production	Transportation	Refining	Distribution	Marketing
Technical job title	Geoscientists	Petroleum Engineers	Mechanical Engineers	Chemical Engineers	Industrial Engineers	Analysts and Traders
Operational Job	Oil Drillers and Seismic Crews	Oilfield Workers	Pipeline Workers	Plant Operators	Terminal Operators and Truckers	Service Station Attendants
Support Position	Landmen	Petroleum Attorneys	Petroleum Accountants	Human Resources	Information Technology	Administrative Assistants

Source: From Petrostrategies 2011. [22]

In some low-income countries, the capacity to meet the industry professional requirement is low, especially in the early stages of the development of an extractive industry. General

[19] UNCTAD 2005
[20] In OECD 2008.
[21] UNCTAD 2007.
[22] http://www.petrostrategies.org/. Accessed on January 2012.

national education base often doesn't offer enough support for the activity, and the lack of skilled workers is usually replaced with expatriates, whose proportion in the total could be very high.[23] To reduce this gap, government and companies commitment in investing in local human resource development is essential. The promotion of local education and the creation of specialized training centers for mining/oil operations have multiple benefits not only for employment in the host country, but also for companies, which can avoid the expensive need to expatriate professionals from other countries.[24]

In the mining sector, artisanal and small-scale mining can have an important role in local employment, especially in poor countries; however their contribution is difficult to estimate because of the informal nature of the activity, which is performed in remote location and may be pursued during periods of seasonal agricultural inactivity or underemployment.

At the local level, large scale extractive projects can have relevant employment effects, but the net impact depends on how they affect employment in pre-existing activities, like agriculture or small scale mining. How many benefits a community can capture also depends on its capacity to directly qualify for the available jobs opportunities or to indirectly participate in supporting activities at any stage of the value chain. (Annex II) shows the different job and business opportunities that a mining project can offer during its life).

2.1.4 Economic externalities and development of other sectors

If properly conducted, the exploitation of extractive industries can have positive externalities on other sectors of the economy as it can contribute to the establishment of new industries, new employments and related activities that might not otherwise be developed in the country.

For example, according to the American Petroleum Institute (API), in 2009 the total economic impact of the oil and gas industry in the United States amounted to 5.3% of the total employment, 6.0% of the labor income and 7.7% of the value added. However, direct impacts, which occurred within the oil and natural gas industry, were clearly lower than the sum of indirect and induced impacts that took place in other sectors throughout the supply chain. In fact, direct impacts have represented only 1.3% of the country total employment compared with 4.0% of indirect and induced effects, and 3.3% of total value added compared with 4.4% from other sectors (see Table 2.3.).

[23] This is especially common in senior or higher positions, which are difficult to recruit locally
[24] A good example is the CEIM in Chile created by Minera Escondida See: http://www.ceim.cl/

Table 2.3. **Total direct, indirect, and induced impacts of the Oil and Natural Gas Industry to the United States Economy, 2009**

Sector Description	Employment*	Labor Income** ($ million)	Value Added ($ million)
Direct Impact of the Oil and Natural Gas Industry	**2,192,392**	**$176,305**	**$464,574**
Indirect and Induced Impact on Other Industries	**6,968,174**	**$357,243**	**$617,126**
Operational Impact	***5,786,244***	***$290,564***	***$501,749***
Agriculture	91,218	$2,580	$3,510
Mining	12,982	$913	$2,235
Utilities	27,397	$3,554	$12,091
Construction	122,132	$6,027	$7,207
Manufacturing	396,459	$27,933	$50,156
Wholesale and retail trade	883,136	$40,242	$67,406
Transportation and warehousing	249,301	$12,486	$17,256
Information	117,511	$10,495	$20,881
Finance, insurance, real estate, rental and leasing	771,363	$35,111	$139,389
Services	2,890,314	$136,279	$164,592
Other	224,431	$14,944	$17,026
Capital Investment Impact	***1,181,930***	***$66,679***	***$115,377***
Agriculture	15,524	$460	$659
Mining	3,080	$216	$541
Utilities	3,740	$483	$1,763
Construction	9,482	$454	$588
Manufacturing	196,690	$14,966	$25,355
Wholesale and retail trade	194,274	$10,099	$17,648
Transportation and warehousing	51,281	$2,587	$3,807
Information	32,896	$3,259	$6,886
Finance, insurance, real estate, rental and leasing	123,551	$5,876	$22,783
Services	538,104	$27,276	$34,497
Other	13,311	$1,004	$850
Total Economic Impact	**9,160,566**	**$533,548**	**$1,081,701**
Percent of United States Total	**5.3**	**6.0**	**7.7**

* Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
** Labor income is defined as wages and salaries and benefits as well as proprietors' income.
Value added refers to the additional value created at a particular stage of production. It is a measure of the overall importance of an industry and represents the industry's portion of United States gross domestic product ("GDP").
Source: API 2011.

Countries must encourage the capture of these direct and indirect impacts by promoting the development of linkages.[25] Basically, linkages can be within the industry chain, backward (connecting an industry with their suppliers), and forward (connecting companies with beneficiators to produce value added goods), but also horizontal linkages with other industries in the economy to develop alternative uses of the knowledge or the generic technologies from the industry. These business linkages can significantly improve the productivity and diversification of the economy.

Moreover, technology spillovers and managerial know-how from specialized foreign companies can provide a multiplier effect, especially when countries have the human and institutional capacities to absorb them. Though, in countries with weaker domestic

[25] Albert Hirschman suggests in the 1970s that three possible linkages exist between the commodity sector and the industrial sector. The first of these are fiscal linkages in which a measure of resource rents are appropriated by the government and used to promote industrial development in unrelated sectors. The recent commodities boom, of course, makes this much more feasible than during the era of declining commodity-manufactures terms of trade. The second linkage is the consumption linkage in which incomes earned in the production of commodities generate the demand for locally produced industrial goods. However, the removal of protective tariffs has meant that in the modern era, many of these consumption leakages are being experienced abroad rather than domestically. The third are the production linkages—backward in the supply of inputs and forward in the processing of commodities. Also, there is the possibility of horizontal linkages in which capabilities developed in backward and forward linkages into commodities serve the needs of other sectors. See: Kaplinsky, 2011.

capabilities, there is the risk that foreign companies may work in isolation and even drive out of business existing domestic firms (like artisanal and small-scale mining companies).

The creation of industry clusters - grouping of enterprises that are interrelated and that depend on each other - is an effective instrument for business interaction and for coordinating productive resources in the sector. They contribute to the development of a network between government, universities and foreign and domestic firms that allows a progressive incorporation of domestic firms into the main activity, especially in countries where domestic capabilities are at a nascent stage.

The interaction and collaboration that industry clusters allow among local and foreign industry participants have positive impacts for both sides. Firms that are part of these clusters benefit from the dissemination of knowledge, can reduce transaction costs, acquire best practices, level their playing field, and increase their competitiveness by meeting the standards of the international mining/oil industry. At the same time, they acquire the capacity to innovate and create knowledge, taking advantage of new potential business opportunities to serve the industry or other economic sectors.

2.2 Environmental impacts

In spite of their potential positive economic impacts, extractive activities tend to leave a strong environmental footprint that must be addressed. The environmental impacts take place along the entire value chain, and have potential negative effects depending on the type and size of the extractive activity, the location and surrounding areas, and the technology used. The larger the oil field or mine, the greater the impacts, and these are more complex when the extractive activity occur near ecologically or socially sensible areas.

In the case of oil and gas, improperly planned seismic tests and drilling activities, flaring of excess gas, deforestation from on site operations, oil leakages spill through all the supply chain, and accidents can be highly pollutant, affecting the natural life of the area, the land and water, and the performance of other economic activities like fishing or tourism during a long period.[26] In mining, the most common negative environmental impacts include landscape alteration (erosion, formation of sinkholes), air, soil and especially water pollution (groundwater and surface). Mining is a water intensive industry and the sole utilization of this resource could be especially critical in areas where water is scarce or is highly required by other local activities (agriculture, drinking) or ecosystems. For extractive industries in general, decommissioning and closure of mines is another relevant source of negative environmental impact if not properly managed. The cost of rehabilitating sites can be expected to be higher in those mines located near populated or agricultural areas.

Reducing environmental negative impacts is an imperative. However, it can provide opportunities to develop local skills in the process of mitigating the carbon footprint of extractive industry activity, the excessive emission of greenhouse gases and their effects on climate change. These include the development of renewable sources like biofuels (example of Brazil with ethanol),[27] and energy efficiency initiatives that can stimulate the surge of

[26] The explosion of deepwater Horizon oil rig working on the BP-operated Macondo prospect in the Gulf of Mexico that occurred in 2010 is said to be the largest accidental marine oil spill in the history of the petroleum industry. The leak released about 4.9 million barrels of crude oil that caused extensive damage to marine and wildlife habitats and to the Gulf's fishing and tourism industries.

[27] There are significant challenges in switching to biofuels, including the scarcity of raw materials (arable land, water, competition for use by food and beverage industry) and the logistics limitations

research and local producers of technology to provide energy solutions using local renewable resources.

In the mining sector, expanding market for recycling can also have positive environmental effects. Roughly 70% of all metal is used only once and then thrown away; and only the remaining 30% is recycled. Iron and steel are the world's most recycled materials and among the easiest materials to reprocess. Mining waste and air and water pollution are reduced significantly when a steel mill uses recycled metal scraps.

Governments face the challenge to minimize and manage the environmental effects caused by extractive industries. Policies and environmental regulations in the host country and their effective enforcement are key to encourage foreign and local companies to adopt the highest standards of environmental protection. But at the same time, the task of reducing the negative impacts can also be seen as an opportunity to incorporate local participation, universities, companies and local communities in the solutions.

2.3 Social impacts

Extractive industries activities can have social impacts that range from the disruption of local communities lifestyles to political impacts affecting the quality of governance.

On the one hand, local communities can enhance their well-being in real terms due to the economic contributions coming from new job creation (direct and indirect), new business opportunities, higher salaries, and local infrastructure and social services improvements such as roads, electricity, health and education. But, on the other hand, extractive activities can be a source of tensions from the initial stages of exploration and development, due to the high influx of people and the intense utilization of land and local natural resources in areas sometimes used for other activities (like small scale mining).

Adverse social impacts in local communities from extractive industries operations can include:

- Displacement of population and disruption of their life. The sudden arrival of expatriate workers can be socially challenging for local communities, perceived as competitors for local resources utilization, create crowding-out effects in services (housing, infrastructure, etc) and even lead to a reconfiguration of local social structures;

- Management of land (including its utilization for waste disposal). This issue is particularly sensitive when extractive activities compete with other uses of land like farming, artisanal mining, or tourism activities and also when it is inhabited by indigenous people for whom land usually represents their source of living and the core of their collective identity and spirituality;

- Economic dependency and inequalities. Local economy can highly rely on meeting mine or oil and gas exploitation needs, being vulnerable to boom and busts in commodities prices or changes in levels of activity. Regarding economic inequalities, they can be internal, between incomes and living conditions of members of a community that work in the mine and the rest, and also external, between regions receiving resource rents or royalties and those who do not.

Regarding governance, high rents surrounding extractive activities can be a source of conflicts and corruption. As some governments obtain more resources from one single source, they become less dependent on their population as a source of revenue and at the same time less accountable and responsive to the societies they govern. Rent seeking

behavior, aimed at the capture of more of a fixed amount of wealth rather than creating it, can even degenerate in violent conflicts in which armed groups fight for control over mineral or oil spoils. A transparent and accountable system, combined with well crafted social and community participation programmes can provide good ground for addressing the various social challenges inherent to natural resource endowments.

Reaching the community participation and acceptation must be a relevant part in the corporate social responsibility of extractive industry companies. They are accepted by the public at large because of the role they play in society, providing the essential materials for society's needs and well being. However, at the level of individual projects this acceptance is neither automatic nor unconditional, and today there is the need to gain and maintain the support of the people that live and work in the area of impact and influence of any given project – to have a Social License to Operate. Therefore, in terms of community participation, identifying valid community representatives and understanding their real issues of concern and aspirations around an extractive industry operation is a key challenge for companies[28].

[28] Stakeholder mapping is a powerful tool for systematically identifying stakeholders, depicting their inter-relationships and inventorying their concerns, hopes and dreams around the operation.

3 Development of local content strategies – Optimizing national value creation

Natural resources rich countries are increasingly eager to leverage on the positive impacts of their extractive industries and to maximize the capture of value along the supply chain. The goal is to use their natural resource endowments to develop a competitive local supply industry that, through employment creation, value addition, technology and knowledge transfer, fosters broad-based sustainable development. In other words, develop conditions to create production (forward and backward) and horizontal linkages between the extractive industries and the host country local economy. This goal is commonly referred to as local content.[29]

However, to generate the conditions to improve local content, countries must address several challenges at different levels, most of which are complex with long-lead time to fix. The main challenges can be grouped into four categories: (i) lack of human capacity and education skills, (ii) poor infrastructure, (iii) weak industrial base, (iv) poor governance and inadequate business environment. These impediments and ways to address them are discussed in this chapter.

3.1 Human capacity and education

The existence of a skilled and experienced workforce is essential for the development of an indigenous industry. From the developing countries' perspective, skills shortages hinder the incorporation of local workers into the extractive industries and the development of an industrial base necessary to spread the benefits of these sectors to other areas. From the operating companies' perspective, skills shortages can cause the delay of new projects, increase costs and even hamper the fulfillment of local content requirements. Countries should take into account these restrictions when designing local content policies.

In the case of sub-Saharan countries, Peek and Gantes (2008)[30] identify four main causes of the shortage of skilled workers in the oil and gas industry:

- Scarce educational facilities;
- Weak vocational and technical training;
- Lack of school accreditation; and
- Increasing demand for higher skilled workers in the industry.

In order to address the skills shortage constraint, countries must undertake local capacity building in two ways: by creating an educational base (to support development in the long run) and improving the direct participation of the local workers with companies in the industry value chain.

The development of a general educational base includes designing primary, vocational, secondary and university education syllabus suitable to support the development in different areas and levels of specialization. The Government role in the strengthening the educational and training base is crucial: it has to provide sufficient resources and proper education

[29] Petrad 2009.
[30] Peek, P. and Gantès P. 2008.

facilities to increase the coverage of formal education and the general education level of the population. High commodity prices in the last decade represent a good opportunity for resource rich countries to invest in education.

In terms of improving local workers participation in the extractive industry, countries can boost local capabilities through:

- Research and Development (R&D) programmes, funds and specialized institutes. The link between major companies and local universities and training institutes is key to design programmes with the proper syllabus to meet the skills requirements of the industry, as well as for the development of on-the-job training programmes;
- Introduction of local content provisions for training and hiring national workforce at different levels of the value chain; and
- Creation of industry linkages and extensive supplier development programmes, including training, product development, testing and factory auditing.

For example, in Brazil, two main instruments were introduced in the late 1990s to provide funding for R&D and the development of local capacities: the Oil and Gas Sectoral Fund (CT-Petro) and the R&D Clause. The first fund is built up by a portion of the royalties collected from the production of oil and natural gas, and the second comes from a clause in the concession contracts for exploration blocks, which requires concessionaires and oil companies to allocate 1% of the gross revenue from the fields that pay the Special Share Tax to R&D. These funds support, among others initiatives, the National Petroleum Agency Human Resources Program (PRHANP), which encourages the inclusion of specialization disciplines related with oil, natural gas and biofuels in the curriculum of learning and research institutions, and which grants scholarships for master and doctorate students on such disciplines.[31]

Several producing countries have applied hiring quotas or targets for training of local workers. Countries like Nigeria and Angola have even set targets of participation, to increase local staffing in oil companies; however, companies have encountered difficulties in achieving these targets, especially for higher level staff. These policies are more effective when complemented with training programmes supported by the extractive industries and intended to ensure the availability of skilled workers, according to the sector changing requirements.

Talent creation requires a high degree of coordination between companies. It has been found that in some cases oil companies show a lack of collaboration in terms of training and adopt a strategy of "going at it alone". Therefore, governments could play a relevant role in promoting the interaction of stakeholders to coordinate the training of human capital.

3.2 Infrastructure

A weak infrastructure prevents the expansion of the manufacturing base. Public utilities as roads, railways and air transport, telecommunications, electricity and water supply constitute an environment which is more or less enabling for business development and productivity.

[31] Since 1999 it has benefited more than 5,000 students, mostly in graduate and post-graduate levels, allowing them to join the professional market of the oil, natural gas and biofuels industry. *Source:* ANP. http://www.anp.gov.br/. Accessed in January 2012.

Infrastructure standard also affects the profitability assessments made by investors when considering investments initiatives in a country. In Africa for example, poor infrastructure accounts for 40% of transport costs for coastal countries, and up to 60% for landlocked ones.[32] This not only undermines producers' competitiveness but also lowers consumer welfare, as imported inputs and final goods are more expensive. In addition, good communications and energy infrastructure are essential to support industry linkages, create new industries and expand local business opportunities.

Table 3.1: **Sub-Saharan Africa: estimated annual infrastructure investment needs in selected industries 2006 - 2015 (Annual average in millions of dollars)**

Item	Electricity	Telecoms	Roads	Rail	Water[b]	Sewage	Total	Financing gap[c]
New investment	5.5	3.2	9.8	-	1.8	2.7	22.8	23.5
Operation and maintenance	3.3	2.0	7.4	0.8	1.4	2.1	17.2	
Total	8.8	5.2	17.2	0.8	3.2	4.8	40.0	23.5

Source: UNCTAD WIR 2008.

Governments have the main responsibility in ensuring that these infrastructures are developed and put in operation. In order to tackle the considerable investment required, governments are more willing to attract a greater involvement of the private sector - including local and transnational companies (TNC) - in infrastructure financing, investment, ownership and management, and concentrate their efforts in providing a clear regulatory and legal framework, as well as proper stimulus to private participation.

To address the lack infrastructure, host countries must focus on: (i) building the appropriate legal, institutional and regulatory framework, (ii) managing different forms of private involvement and financing, (iii) looking for support in investment promotion agencies for foreign investment, and, (iv) taking into consideration social factors related to the investment in infrastructure.

The legal and regulatory framework is a major determinant of a country's ability to attract and benefit from foreign investment. Before committing funds to any project, investors consider whether laws and contracts are likely to be properly enforced and whether their rights and responsibilities are well defined and likely to be respected. The legal and regulatory framework for issuing licenses or concessions should define the rights and obligations of utilities, clarify pricing mechanisms and establish procedures for dispute resolution. The establishment of a strong and autonomous regulatory agency is essential to implement laws and regulations in infrastructure industries.

The private (local or foreign) provision of infrastructure assets, including non dedicated infrastructures, may take many forms from full privatization to joint ventures, concessions and management and lease contracts (see table 3.2). Governments must be aware of the risks of foreign control in certain infrastructure segments, and of their real capabilities (institutional and human) to manage complex contracts successfully.

[32] United Nations Economic Commission for Africa, 2011. Minerals and Africa's development. The international study group report on Africa's minerals regimes.

Table 3.2. **Equity and non-equity forms of private involvement in infrastructure**

Fully equity							Fully non-equity
FDI projects (including privatization and greenfield projects and joint ventures)	Concessions						
	Build, own, and operate (BOO)	Build, lease, and own (BLO)	Build, own, operate, and transfer (BOOT)	Build, operate, and transfer (BOT)	Build, rehabilitate, operate, and transfer (BROT)	Rehabilitate, operate, and transfer (ROT)	Rehabilitate, lease or rent, and transfer (RLOT)	Management and lease contracts

Source: UNCTAD WIR 2008.

It is important to highlight that infrastructure development is also an opportunity for the local development of capacities in the construction sector. Local content requirements can be applied in order to promote local firms' participation in major projects with foreign companies or even assume the priority in some specific construction projects.

Financing investments is also a great challenge. Public sources, like local public financial institutions, governments and donor agencies make important contributions and low income countries still rely heavily on these sources of funding.[33] However, countries must be open to take advantage of the different sources of private funding available for infrastructure projects (e.g. project finance by private banks and private sponsors). This incorporates new financing actors like private equities investors and State-owned or government-linked entities, including sovereign wealth funds (SWFs). Financing infrastructure investments has many advantages for private investors, as infrastructures are assets that provide a steady return throughout the economic/investment cycle (they are referred as a "defensive asset"), represent a low risk investment and act as a risk reduction tool for a portfolio due to their low correlation with the traditional public market asset classes.

Investments promotion agencies (IPA) can help governments attract foreign investments in infrastructure. IPAs provide foreign investors with information about existing investment opportunities, assistance in approval process and facilitate investment. Likewise, they may help governments identify areas in which foreign investment can make the most effective contribution and complement local efforts, and provide feedback about the foreign investors' perception of the country.

For example, a survey of promotion agencies conducted by UNCTAD and WAIPA in 2008[34] revealed that IPA's perceive poor legal or licensing systems as major barriers to attracting foreign investment into infrastructure. According to the survey, financial barriers are more common in transport and electricity generation, and low private participation and lack of clear competition policies are apparent in telecommunications. Therefore, governments should design a sound strategy that takes into account investments barriers and includes an adequate regulatory and institutional framework before simply opening to foreign and private investment.

Finally, countries must consider the potential impact of infrastructure projects in the population's quality of life. Some investments like those related to water supply have a clear social dimension, and accessibility to the population represents a priority. In countries with weak purchasing power, governments may need to subsidize tariff payments in some form. Likewise, local participation with foreign companies in infrastructure building can also have

[33] World Bank. Identifying main sources of funding for infrastructure projects with private participation in developing countries. Working paper N°9.
[34] UNCTAD 2008. "Promotion of investment into infrastructure A survey of investment promotion agencies".

positive social externalities, not only in direct job creation during construction periods, but also as a source of new technologies, knowledge and expertise that generate valuable linkages and interactions with the local community and the rest of the economy.

3.3 Industrial base

The development of local content in the extractive industries must be based on existing domestic capabilities in manufacturing and services. However, in many countries the industrial base is weak, narrow, has poor access to technology, financing and information, and consequently, is not competitive in the international industry context. Building a solid industrial base represents a major challenge for developing countries.

To address the challenge of improving the industrial base, it is essential that firstly governments conceive a clear industrial policy. This policy must be consistent with a development strategy promoting the interaction of all the stakeholders along the value chain (private and public actors), establishing clear incentives, attune to real local capabilities and be dynamic in time.

Effective local-content instruments to improve the industrial base must be integrated into this industrial policy. For their design, it is recommended that governments undertake a diagnostic analysis to clearly identify at least three general aspects:

- The priority areas that would have the desired multiplier effect on the economy;
- The ideal extent of the intervention. The country must properly assess the real local capacity to provide services and goods that comply with industry quality requirements and plan with a long-term perspective an industrial base that must be able to compete independently in an open international environment in the future. The intervention must consider as well the impact of international agreements that can limit the policy space for local content instruments' application (for example the WTO Trade-Related Investment Measures (TRIMs) - See Box 3.1 for details);
- How to implement measures. Proper implementation requires a thorough knowledge of the extractive industries value chain and the business dynamics.

Box 3.1. What Local Content Strategies are allowed under WTO Rules[35]

The WTO Agreement on Trade-Related Investment Meas-ures (TRIMs) seeks to ensure that goods purchased within a country do not discriminate against international competi-tors. The rules however make some allowances for domestic regulation to require or incentivise local procurement by an enterprise ("local content requirements") on a discriminatory basis (i.e. allowing local firms to supply goods that are not competitive in relation to international markets). The rules also make allowances for domestic regulations to restrict the volume or value of imports that an enterprise can purchase in order to further incentivise demand for local goods. The volume of this restriction is related to the level of products that the enterprise exports ("trade balancing requirements").

Under TRIMs, developing countries who are members of WTO are granted these allowances for a "transitional" period of five years (seven years for the category of Least Developed Countries). In July 2001, the Goods Council of WTO extended this transition period for certain requesting countries, taking into account the individual financial, trade and development needs of the Member in question.

[35] *Source:* Incentivizing Local Economic Development in the Extractive Industries Sector through transaction Chain Analysis, Briefing Note 8, Michael Warner, Overseas Development Institute (ODI).

In many countries TRIMs is not applied to “government procurement”, which is considered a “plurilateral” area of agreement (in contrast to “multilateral” agreements to which all member countries subscribe).

In general terms, the instruments for implementing local content to widen the industry base can be classified into two groups according to their main objective: those aimed at increasing local industry participation and those aimed at building up local industry capacity.

The first group of measures is more effective in obtaining visible short-term results, increasing rents and promoting a rapid incorporation of local industry into the value chain. Nevertheless, they are not necessary conducive to a sustainable and internationally competitive industry in the long run. The instruments included in this group are:

- Local-content performance targets, percentages of preference for national suppliers;
- Joint ventures between foreign and national contractors to allow immediate access to projects;
- Taxation regimes, such as exemptions for the utilization of local equipment;
- Regulation and bidding parameters that include local content criteria or that discriminate in favour of local industry in production licenses and contracts.

The second group of measures is applied on the understanding that a real change in long-term development of local content is only likely to be achieved by building national and local skills, so that local actors are able to create and take advantage of opportunities. The instruments included in this group are:

- Investing in infrastructure and developing an education system that generates the right skills for the local industry;
- Promoting R&D to spread the creation of knowledge that can be used in other sectors around the extractive industry;
- Stimulating the creation of industry clusters and linkages, to transfer technology and knowledge from international to domestic companies.

Finally, local content instruments have a higher probability of expanding the industrial base when applied in countries with good governance, prudent fiscal policies and credible institutions that generate the enabling environment to develop the extractive industry and distribute its benefits.

3.4 Good governance and a proper business environment

Despite the importance of these factors in ensuring sustainable development gains, many rich natural resources countries still lack of an enabling business environment to stimulate local business creation. Policies are aimed at short term gains rather than at long term development objectives and easy access to revenues make governments less accountable and more likely to preserve the interests of small governing elite with limited benefits for the population.

Countries must address the governance challenge by providing an appropriate legal, regulatory and institutional framework in which companies, local and foreign, have the incentives to invest and develop productive activities and that at the same time, gives enough guarantees to prevent corruption and rent seeking behaviour. There are some on-going international initiatives to promote transparency and accountability in the extractive sector, with different treatment of business confidentiality and government sovereignty issues. Two well-known approaches are the Publish What You Pay (PWYP) campaign and the Extractive Industries Transparency Initiative (EITI) (see Annex III)

Some key elements of governance that support the development of sound local content initiatives in extractive industries are:

- A legal framework governing the exploration and exploitation of extractive industries that establishes clear ownership and property rights;
- Independent regulatory powers strictly separated from operating activities. This is essential to ensure transparency and to avoid creating a fertile ground for rent-seeking and corruption;
- A clear fiscal and administrative framework for the extraction of natural resources. This involves, for example, stable and clear taxation policies and efficient processes for the issue of licenses;
- A system of revenue management governing the sharing and distribution of the rents from extractive industries;
- Clear regulation and policies on workers' rights (including health and safety), the protection of the environment and the rights of local communities.

Regarding the business environment, it must be take into account that the willingness of companies to invest in any project depends on the risk-reward relationship they perceive, and a clear and stable investment environment reduces significantly the main sources of risk.

Transparency, political and macroeconomic stability and predictability are decisive to create a good investment climate. Sound policies to manage key economic variables like domestic prices evolution, the exchange rate and interest rates, as well as credible authorities, are crucial to attract major investments. Likewise, as seen in previously, fiscal budget stability and prudence are basic elements that support the macroeconomic stability.

In terms of investment financing, the limited access to funds and their higher costs can constitute a comparative disadvantage to local entrepreneurs. Many local entrepreneurs lack the ability to finance projects when awarded the contracts for a variety of reasons. Access to long term finance is limited and the short term facilities that may be available in the country often attract high interest rates. Moreover the cash flow to service these debts often start when the project is completed and performing well, and lenders are usually not prepared to assume the risk of a borrower not being able to complete the project. Consequently borrowers are often required to provide some sort of guarantee which commits them to provide additional capital to the project in the event of cost over-run or to pay all or part of the project debt upon failure to attain completion. Also, lack of local entrepreneurs marketing knowledge in foreign markets makes it difficult to supply goods that are not available on local markets on time and of the right quality.

Alternative financial sources and financial instruments must be available to support local content development. Funding can be obtained from sources such as: (i) multilateral and regional development banks, (ii) special funds designed especially for new firms start-ups, and (iii) oil/mining companies support. Companies can arrange for financial agreements or different formulas to support local companies, including allowing loans at a relative low interest rate, with the contract as guarantee, or providing for more frequent payments in the contracts, to improve liquidity in the local companies. New financial regulations are also introduced in some countries such as Angola with the objective to strengthen domestic banking institutions capacities; but the extent to which these regulations will positively impact local content policy is still unknown.

BOX 3.2 New financial reforms in the Angola oil Sector

On 10 November 2011, the Angolan Parliament voted a new banking legislation that obliges oil companies operating in Angola, much of which are foreign, to use local banking institutions to complete their financial transactions, including payment to third parties such as government taxes, and payment of suppliers or their expatriate workforce, whether based in Angola or abroad. The Angolan government considers that the current exemptions provided to oil companies regarding the use of foreign financial institutions are no longer necessary since Angolan banks have matured and are able to deal with such transactions themselves.

In practice, with this new law, operating foreign companies will now be required to open accounts with domestic banks, from which all payments related to their oil operations shall be processed. The Central Bank envisages the implementation of this new law in two phases to allow the adjustment of its monetary policy and for oil companies and local banks to implement the necessary changes. In the first phase, oil companies will use local banks to pay taxes and bills owed to local providers. The second phase would require oil companies to use local banks to make payments to foreign suppliers. Oil companies and commercial banks will have the next two years to adjust to the new legislation.

The objective is to strengthen the Angolan economy. With a production of about 1.8 million barrels per day, Angola is sub-Saharan Africa's second largest oil producer. Crude oil Production accounts for around 45% of GDP, 75% of government revenue and 95% of export revenue. In 2009, oil price volatility caused macroeconomic disturbances which included fiscal and current account deficits, a slowdown in credit, exchange rate depreciation and a drop in international reserves. Although there has been a significant recovery in the following two years, vulnerabilities have been exposed. As a way to insulate Angolan economy against the type of volatility seen in 2009, it is argued that oil companies should be obliged to conduct financial transactions through Angolan banks, which could contribute to the development of the domestic banking sector and create something of a buffer against oil prices volatilities.

However, there are concerns that an influx of foreign currency (estimated at $10 billion per annum in the domestic banks with the new legislation) could lead to an appreciation of the Angolan currency, the Kwanza. Furthermore, the impact of this new law on the various linkages within the oil sector is still to be evaluated.

Source: Angola official journal, Songhai Advisory, Africa Energy Intelligence.

Finally, as previously mentioned, the design of an enabling business environment must consider how local content requirements or performance standards can be frustrated by international commercial agreements. WTO agreements have powerful implications for local content policies requirements. Under the TRIMs, the General Agreement on Trade in Services (GATS), and the Agreement on Government Procurement (GPA), WTO member countries are obliged to treat foreign investors and service suppliers in the same manner as local ones, and to ignore any internal political pressure to discriminate in favour of domestic suppliers over foreign competitors. Governments must be aware of these restrictions and possibilities in the design of sound local content regulations.

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4 Good practices in local content strategies and policy lessons

Several countries are often referred to in the literature on local content development.[36] These include Norway, Malaysia, Brazil and Trinidad and Tobago in the oil and gas sector, and Canada, Chile in the mining sector. This chapter examines local content strategies in three developing countries: Chile (copper), Brazil (oil), and Trinidad and Tobago (natural gas), highlight good practices and draw some policy lessons. They represent three different approaches in addressing the development based on the exploitation of their natural resources.

4.1 Chile

Chile is an example of a mining country in which no explicit local content has been applied but where good governance, an improved environment for business creation, and the presence of a strong government-owned national company in the mining sector have been the basis for the development from the extractive industry.

Among the extractive industries in Chile, mining -and copper in particular- has been the main contributor to national development. In 2010 Chile was the world's prime copper producer, with 34% of world production, and the country with the largest copper reserves (24%).[37] The copper industry accounted for almost 6.2% of the country's GDP in the last 30 years, and over 42% of the total exports in the last 20 years. However, copper has only a limited contribution to employment with 0.8% of the national total in 2008.[38]

In the second half of the 1970s, the Government introduced deep structural neo-liberal reforms, in the economy in general and in the mining sector in particular to attract foreign investors, but kept Codelco (the national copper company) in State hands. Among the reforms in the mining sector were a new mining law that secured property rights for investors,[39] a new tax regime with fiscal incentives for mining firms, as well as other policies to liberalize trade and promote exports. During the 1990s, these reforms resulted in an increase in foreign investment and copper exports, and in a spin-off development of other economic sectors that contributed to diversify exports and the economic base.

4.1.1 Macroeconomic stability

Macroeconomic stability has been essential for the long term investments required by the mining sector. An active exchange rate policy was pursued, complemented by a relatively loose monetary policy. The aim was to avoid real exchange appreciation and protect the international competitiveness of other tradable sectors. Institutional roles in the macroeconomic management were also clearly defined, and the burden of maintaining the real exchange rate at a competitive level and the adoption of inflation targets was shifted to the Central Bank, the only institution responsible for the monetary policy management.

[36] See World Bank 2011

[37] Deutsche Bank - DB user Guide to Commodities 2011.

[38] Arellano, José Pablo (2011).

[39] Despite the fact that the main Mining Law was passed during the military dictatorship, democratic governments have not changed it significantly since 1990.

Fiscal prudence complemented macroeconomic stability. Two main policies had successful results in Chile: (i) the budget structural balance rule that limits the fiscal spending (which is supported by the Fiscal Responsibility Law) and (ii) the establishment of reserve funds.[40] With both instruments, governments have made a careful use of mining resources to avoid inflation and "Dutch disease", and to support social programmes during economic crises. By insulating public spending from short term copper price fluctuations and the business cycle, these policies have helped significantly to preserve fiscal discipline.

4.1.2 Local content policy

Chile does not have an explicit local-content policy. The development model adopted since the second half of the 1970s discards explicit protectionist market interventions and does not establish limits or restrictions on foreign companies in the form of local-content requirements. Under this scheme, local service providers are forced to be more efficient and to compete against international players on the basis of global benchmarks. At the local level, there are no automatic mechanisms for recycling government revenues from mining industries back to the regions where they are located. The Government assumes the task of ensuring a proper distribution to avoid horizontal inequalities (gap between mineral- rich and mineral- poor regions).

4.1.3 The role of Codelco

The role of the national copper company Codelco in local value retention has been crucial. From the beginning of the 20th century up to the end of the 1960s, the mining industry was in the hands of foreign companies. In that period, the main means of retaining value were through taxes on companies' profits. Since the end of the 1960s, the value retained in government hands increased significantly due to progressive reforms that raised the share of State ownership in these mining companies and, later on, to the nationalization of the copper industry and the creation of Codelco, the world biggest copper company. Up to the beginning of the 21st century, taxes revenues from private mining firms were not significant,[41] and Codelco was the main source of resources from extractive industries.

In the last 20 years, Codelco has been the main provider of mining income and tax revenues to the country. Its transfers have averaged 13.5%[42] of the annual fiscal budget, and the company has played a key role in supporting Chilean economic stability and social development during the last decade.

Year	CODELCO Contribution % Gov. Budget
1990	34.2
1995	15.6
2000	5.7
2005	22.2
2010	15.0
Av. 90-10	**13.5**

Source: Arellano, 2011.

In addition to its direct contribution to government revenues; Codelco has promoted linkages with local firms and supported smaller mining-related companies, has generated demand for local service providers and has formed qualified national professionals.

[40] Surplus earnings are allocated to the Economic and Social Stabilization Fund, the Pensions Reserve Fund and the Contingency Unemployment Programme.
[41] During their first years, mining companies showed losses on their financial results due to the use of accelerated depreciation methods and fiscal exemptions designed to help them to quickly recover their investment.
[42] Arellano, José Pablo (2011).

4.1.4 Governance and business environment

In terms of governance, the credibility and independence of some important institutions like the judiciary system, as well as the good reputation of the civil service of efficiency, low-corruption and transparency, are considered among Chile's strongest assets to attract long term investments.

Moreover, Governments have promoted the interaction between mining companies and universities, especially with the creation of industry clusters. For example, the Consejo Nacional Cluster Minero was created on close collaboration between the Government, mining companies, mining supplier firms, local authorities and universities; and the Fundación Chile, a non-profit organization, was established to promote innovation, transfer management and technological skills, and support the diversification of the local industry.

Based on the Chilean experience, it is possible to identify the following positive lessons regarding local retention of value from the extractive industry:

- Promoting macroeconomic stability and fiscal prudence it's essential for creating a favourable environment for foreign investment and industry development;
- Even in an open economy, keeping a strong national company like Codelco in State hands is a valuable source of local participation and linkages development. However, special attention must be put in avoiding mismanagements, as they could be a source of political corruption and rent seeking behaviour;
- Good governance favours the interaction between stake holders. In the Chilean experience, the creation of mining clusters has generated positive synergies between the Government, universities, mining firms and local companies.

4.2 Brazil

Unlike the example of Chile, Brazil has assumed a different approach, characterized by a strict implementation of local content policies and proactive government action. Two elements might be considered essential in the development of local content from the oil and gas industries in Brazil: (i) the creation of oil industry capacity based in the solid formation of linkages under Petrobras (the national oil company) leadership; (ii) a clear institutional framework and an exhaustive local content policy, managed by the National Agency for Oil, Gas and Biofuels (ANP) since 1998.

4.2.1 Industrial base creation

Within the framework of import substitution policies that many Latin American countries applied from the 1950s until the 1980s, Brazil's Government assumed a proactive role in leading the industrialization process and guaranteed a protectionist environment for the early development of the local industry base. Special attention was devoted to industries considered basic for growth, notably in the automotive, cement, steel, aluminum, cellulose, heavy machinery, and chemical sectors. A model of vertical integration was also promoted in the main national companies. Already at that time, the concept of local content was a central element in the Brazilian strategy of development.

In this context, Petrobras was established in 1953 and until the end of the 1990s it was granted the monopoly of the oil and gas sector, including exploration and production licenses in the entire country. It covered oil/gas refining, transportation and distribution and had the mandate to develop the oil industry from scratch, investing in technology and human capital, and giving priority to the participation of the domestic supply industry.

4.2.2 Technology transfer

Important discoveries of offshore resources began in the 1970s and represented a major challenge in terms of technology and specialized professionals needs. A fast process of technology transfer was required. Initially, Petrobras used numerous foreign contractors, but during the 1980s, the focus was put in the development of domestic technology using licensing agreements with international suppliers. By licensing technologies developed by other companies, Brazilian industry had access to state of the art technology and could adapt it to specific domestic requirements. Nowadays, the Brazilian industry is a global leader in deep-water and ultra-deep water exploration and production.

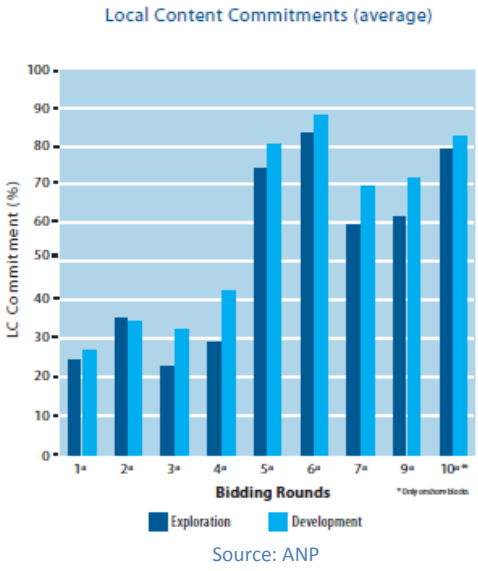
4.2.3 Human capabilities development

The capabilities to innovate and quickly adapt these new technologies were made possible by the existence of a diversified industrial base and the professional and technical capability already in place in the country, enhanced by Petrobras R&D programs and the establishment of excellence centres. By making linkages with universities and academia, and using their existing networks, Petrobras was able to produce fit to purpose solutions for its new production challenges. Likewise, as a result of the conquest of deep offshore resources, Petrobras became an incubator of management talents, technical, geology and geophysics experts that fuelled the development of Brazil's private oil and gas exploration and production industry.

4.2.4 Institutional framework and local content requirements

In 1998, in the context of the opening of the oil and gas sector and the end of Petrobras monopoly, the ANP was established as an independent agency in charge of regulating the petroleum sector, managing a competitive leasing scheme and ensuring local benefits from oil projects.[43] The liberalization of the sector and the creation of the ANP had two main positive effects: (i) accelerating the exploration and development of Brazilian petroleum resources, and (ii) allowing Petrobras to fully specialize in its core business, reorganizing the company to be a major player in the new international competitive environment.

The ANP has assumed a key role in defining clear local content requirements. For this purpose, local content is defined as "the portion of materials, equipments and systems produced in the national territory and the services rendered in it, which the concessionary companies acquire from suppliers established in Brazil". [44] Through the licensing process, the ANP awards petroleum rights in competitive licensing rounds and on the basis of three parameters: (i) cash bonus, (ii) work program and (iii) local content. The ANP determines the minimum acceptable share of local content, which varies depending on the location of the blocks (inland, shallow or deep waters) and the phase of development.



Source: ANP

[43] Among its functions are: issuing tenders, granting concessions for domestic and foreign companies, monitor the activities of the oil sector, including establishing rights to explore for and develop oil and natural gas in Brazil.

[44] From ANP: www.anp.gov.br accessed on January 2012.

This scheme has forced interested international suppliers to establish Brazilian subsidiaries and build up local manufacturing and operational capabilities to be able to participate in the biding process. Consequently, local content commitment has increased from around 25% in average in the initial rounds to almost 80% in the latest, demonstrating a successful incorporation of local industry in the new exploitations.

Moreover, the ANP played a key role in the design of a detailed mechanism for auditing and certificating local content. To assure compliance with contractual requirements of local content, the ANP carries out a quarterly follow-up of the investments and activities performed by the concessionaries. Since 2007, the ANP publishes the Certification System of Local Content, which establishes the rules for compliance with the local content clause of the concession agreements granted as from the seventh round of biddings, and includes the list of companies accredited by the ANP to conduct measurements and certification processes, to give more flexibility to the follow up of the local content requirements compliance.

Some lessons that can be learnt from the Brazilian experience are:

- Having a strong regulatory institution, independent from the national oil company, to coordinate local content regulation is highly advisable;
- An initial period of protectionism or preference of the local industry has been essential to reach an international competitive level. The gradual introduction of local content requirements, coupled with a solid capacities building programme is indispensable to develop the industrial base;
- Petrobras, the national oil company, has been a key instrument to attain a high level of local participation and industry development.

4.3 Trinidad and Tobago

Trinidad and Tobago has focused in the natural gas sector to develop a local content strategy. This strategy assumes that the surpluses of the energy sector must be used as a mean to diversify their economy base and provide sustainable development for the country.

Trinidad and Tobago economy is heavily dependent upon petroleum resources. In 2009, oil and gas accounted for about 42% of GDP[45] and 79% of exports.[46] The country has made a transition from an oil-based economy to one based on natural gas, sector in which important advances have been made in increasing forward linkages in the value chain. Natural gas production was 116 million cubic meters per day[47] in 2010; about half of it was converted into liquefied natural gas (LNG) and exported under long-term contracts and on the spot market. Also, natural gas liquids (NGL) are the feedstock used to develop a large petrochemical industry.

Due to the relevance of the energy sector for the economic sustainability of the country, the "Local Content Strategy for the Energy Sector" was defined in 2004. In this strategy, local content and participation include ownership, control, decision making and preferential access to financing by citizens of Trinidad and Tobago. The strategy also recognises the potential that the energy sector has to develop the capabilities along the entire value chain, capturing opportunities even outside the country. To coordinate the implementation of this strategy,

[45] United States Department of State Information. http://www.state.gov/r/pa/ei/bgn/35638.htm.
[46] World Data Bank.
[47] BP Statistical Review 2011.

design the policies needed and ensure their compliance, the Permanent Local Content Committee was created.

The implementation of Trinidad and Tobago local content strategy for development has three pillars: (i) local capability development, (ii) education and training and (iii) diversification and new business creation. [48]

4.3.1 Local capability development

Local capability development is an important part of the implementation of the local content strategy. For Trinidad and Tobago authorities, this capability is obtained only by increasing local companies' participation in the energy industry, meaning that local suppliers must be given the opportunity to work, learn and acquire knowledge through preferential treatment to reach a competitive level. International producers are therefore required to commit to contracting local companies and manage their contractors as an open portfolio, maximising the use of local capacity. The Government is to establish a database on the status of projects and opportunities for local suppliers, in order to assist operators to find local suppliers and vice versa.

4.3.2 Education and training

Regarding education and training, governmental initiatives include the support of universities, the creation of specialized centres and the design of academic curricula to fulfill the industry requirements. Among the initiatives already taken are: the expansion of the geosciences programs at the University of the West Indies and the establishment of the National Energy Skills Centre/T&T Institute of Technology (NESC/TTIT). The energy programs go beyond the upstream business, to include the needs of the downstream gas sector, increasing the range of capabilities in the value chain. Besides, international companies are encouraged to increase the provision of education and training to workers in key areas and high value skills, to contribute to the development of future business, even in areas that can serve other sectors of the economy beyond the petroleum industry.

4.3.3 Diversification of the economy and entrepreneurs development

Concerning diversification and new business creation, there is a close cooperation between government and the business community to develop the capacity to supply local energy industry needs and, at the same time, create new export opportunities. For that purpose, the Centre for Energy Enterprise Development (CEED) was established in 2004 to: increase local participation in value added energy industry projects; facilitate the expansion in depth and scope of the local energy industry; develop business skills and competencies in the small and medium sized enterprises; encourage innovation and foster new thinking, helping entrepreneurs to capture supply chain niches. In terms of diversification, the local content strategy considers the creation and support of clusters with other industries that have natural synergies with the energy sector and that in the future will contribute to the expansion of the economy base.

Based on the experience of Trinidad and Tobago, it is possible to draw the following lessons:

- For gas producer countries, the creation of forward linkages in the gas sector, with LNG or GTL development, opens a wider source of value capture in the gas chain;

[48] See Ministry of energy and energy industries. Trinidad and Tobago. 2004

- The development of a local content strategy with a long term vision is a useful instrument to focus the efforts on a sustainable economic development and to avoid the overconfidence on natural resources that some producer countries might face;[49]
- Local capabilities development requires a period of special preferences in terms of participation and training. Likewise, diversification requires support measures to local entrepreneurs to capture new business opportunities.

[49] The abundance of natural resources gives a false sense of security, since earnings are expected for long periods of time. This reduces the incentives for governments to create wealth with growth-friendly economic policies, diversification of exports, savings and investments in other sectors.

5 Policy implications and conclusions

5.1 Policy and regulatory implications

Promoting production (backward and forward) and horizontal linkages, both within the extractive industries and with related industries, is a key factor in ensuring that mineral resources exploitation would serve long term development goals in host countries. This requires a set of policy and regulatory actions that are best suited to maximizing the benefits to commodity–dependent developing countries (CDDC) along the entire value chain.

The first step for the host country is to clearly understand the structure of the value chain and ensure that specific segments with higher potential for linkages are identified, while the local capacity is assessed, and the constraints and pre-requisite actions are laid down. Defining clear set of criteria and benchmarks to measure value retention in local economy that could serve as additional tool in the national development planning processes is imperative. In this process, host countries should aim at ensuring a multi-stakeholder participation, including those impacted by the resource exploitation in local communities, especially women, for whom in addition, access to traditional and new sources of energy is improved. A multi-stakeholder approach will ensure that the policies develop also cater for the industries needs as well as the support measures, including access to financing for local entrepreneurs, the development of non dedicated infrastructures, the setting of relevant institutions for monitoring and oversight, and the partnerships required to harmonize regional frameworks, platforms and policies.

Linkages foster learning processes and increases the local value added in the host country economy. Ultimately, these linkages will positively contribute to domestic productive capacities through the development of human capital, skill and technology. The channels for this development to occur include training of personnel, and the construction of relevant education and vocational structures as well as local R&D institutions. Partnering with operating companies in this endeavour should be considered.[50] Such goal should be clearly defined and requirements such as procurement plan specified from the outset in the contractual arrangement between the host country and operating companies, and strategies to achieve these targets articulated in advance. This may include specific policy and regulatory measures in support of local entrepreneurship as well as policy making capacity to better regulate and monitor the implementation of the relevant measures.

However, when formulating local content policies, host countries should take into account commitments made in various international trade and investment related agreements, as the scope for some activities may be restricted by trade agreements with other countries.

Some countries have used national companies to streamline policies that contribute to the development of the extractive industries and consolidate the benefits derived from the industry. The underlying strategy is to have one entity which is highly focused on the industry, and to ensure that there is an orderly exploitation of the resources so that the wealth

[50] Partnership between companies and governments on local content strategies could have mutually beneficial results if they align public economic policy and priorities for industrial development, private sector development, investment promotion and competitiveness. For example, company's local content agreements on training and employment for nationals, and preference to local suppliers, could more closely align with public policy for human capital development, job creation, and technology transfer.

and the benefits are not only enjoyed by the current generation, but also the future generations.

A recent study of the World Bank recommends that government regulations should encourage mining companies to develop local procurement plans, which would assess their current situation and set realistic local procurement targets. Countries could also establish a supplier development fund to reinvest mining revenues back into smaller businesses. Other recommendations include countries reviewing import tariffs and duties, which sometimes discouraged local procurement, and developing regulations that were not overly onerous.[51]

5.2 Conclusions

From the revision of the previous chapters and countries examples the following conclusions can be drawn:

- As extractive industries rely in non renewable resources, local content policies should be conceived as a part of a long run economic growth and development strategy. They would reach a higher multiplier effect if, from the beginning, they are consistent with a sustainable development strategy;

- In terms of regulation, the creation of an independent authority to monitor and enforce local content policies is essential. This Body must give the definition of what constitutes local value added, design reasonable and affordable targets and monitor compliance of local content regulation;

- Country experiences show that a certain degree of preference to ensure local producers participation in the value chain has positive effects in the industry development. In some countries, the creation of a State-owned company has played a significant role in stimulating the local participation in extractive industries;

- Building local capacity in the provision of goods and services to meet international standards. In the area of goods, such laws as mentioned earlier, could be inconsistent with the WTO TRIMS Agreement except for Least Developed Countries who may be given the flexibility to use TRIMS until the year 2020. [52]

- Local content takes time to develop and be competitive so it is important that negotiations to build capacity begin with the extractive companies when they are being given access to the natural resources. Furthermore, the educational system prevailing will need to align courses offered to students with the demands of the sector. This would need collaboration with the industry to undertake the necessary research and development so as to build a competitive supplier base;

- Policies alone will not boost local content development but also factors such as good governance are needed. Rent-seeking behavior, lack of awareness of available opportunities, and long waiting times to certify local contractors to international standards all contribute to stifling growth of local entrepreneurs in the industry. If value retention is to be increased through competitive local participation then there is also a need to establish good institutions and benchmarks to effectively monitor its progress.

[51] World Bank 2012
[52] See decision of HongKong China WTO ministerial meeting (2005).

ANNEXES

Annex I

(a) Oil and gas main actors by segment

STAGE	Main actors	ACTIVITY	Specific participants
UPSTREAM	Integrated (major) companies National & local companies Independent producers (junior) Service companies Government agencies Local communities Professional and non governmental organizations Financing & other services	**Exploration**	Geological and geophysical surveys and analysis services Exploration equipment suppliers Engineering projects Exploration drilling services Government geological information providers
		Development	Reservoir engineering services Drilling services Production equipment suppliers Piping equipment suppliers Construction of production facilities (roads, building, water, others)
		Production	Wells maintenance service companies Equipment and spare parts suppliers Drilling operation services Engineering projects On field services providers
MIDSTREAM	Integrated (major) companies National & local companies Storage companies Pipeline companies Shipping companies Trading companies/brokers Government agencies Financing & other services	**Transport & Storage**	Quality certification companies Ship-owners Charterers Brokers Port operators/ authorities Insurers Energy merchants Ship maintenance services
DOWNSTREAM	Integrated (major) companies National & local companies Independent refiners Independent marketers Local communities Government agencies Non government organizations Financing & other services	**Refining**	Refining equipment suppliers Maintenance services Chemical processes licensing companies Engineering and procurement services
		Marketing	Energy marketers Gas dispatch regulators Market analysis

(b) Mining main actors by segment

STAGE	Main actors	ACTIVITY	Specific participants
EXTRACTIVE	Integrated (major) companies National & local companies Independent producers (junior) Service providers companies Government agencies Local communities Professional and non governmental organizations Financing & other services	**Exploration**	Geological and geophysical surveys and analysis services Exploration equipment suppliers Engineering projects consulting Exploration and drilling services Government geological information providers
		Development	Engineering services Production equipment suppliers Construction of mine facilities (e.g. roads, building, water) Environmental and market analysis specialists Drilling services
		Mining	Equipment and spare parts suppliers Mining operation services Engineering projects consulting On field services providers (admin., technicians, others) Environmental specialists
PROCESSING	Integrated (major) companies National & local companies Independent refiners Service providers companies Local communities Government agencies Financing & other services Non government organizations	**Processing**	Equipment suppliers Maintenance services Engineering and procurement services Chemical products providers
		Refining	Refining equipment suppliers Metallurgical analysis Environmental specialists Engineering and procurement services Chemical products providers
		Value addition	Design services Market analysis Engineering and procurement services Industrial marketing services
TRANSPORT	Integrated (major) companies National & local companies Shipping companies Trading companies/brokers Government agencies Financing & other services	**Transport &** **Storage**	Quality certification companies Ship-owners Charterers Brokers Port operators/ authorities Insurers Ship maintenance services

Source: UNCTAD.

(c) Description of companies participating in the oil and gas and mining value chain:

(a) Fully integrated companies or major companies. They are engaged in all the stages of the oil and gas and mining industry, from exploration to marketing, e.g. *ExxonMobil Corporation, BP, ChevronTexaco, Royal Dutch/Shell; BHP Billiton, Rio Tinto, Anglo America*;[53]

(b) Independent producers or junior mining companies. These are smaller companies that only explore and/or produce crude oil and natural gas. They mainly look and test for marketable reservoirs or ore deposits and sell the properties to larger companies, e.g. *Apache Corporation, Devon Energy Corporation and Pioneer Natural Resources;*

(c) Independent refiners. They purchase crude oil, concentrates or ore and process it into finished products. In the oil sector, these companies may also own wholesale and retail marketing outlets (being refiners and marketers) or sell their products to marketing companies, e.g. *Frontier Oil Corporation, Sunoco Inc., and Valero Energy Corporation;*

(d) Independent marketers. They purchase refined oil products to majors or independent refiners, and sell them at retail outlets. It includes organizations whose primary business is selling refined products and major retailers like *Wal-Mart* and *Carrefour*, which sell gasoline in addition to other merchandise;

(e) Pipeline companies. They transport crude oil, refined products, natural gas and natural gas liquids using networks of pipes and pumping or compressor stations. These companies may be independent operators or joint ventures of operating companies, e.g. *Trans Alaskan Pipeline System, and El Paso Corp. and Transcontinental Gas Pipe Line Corp. for Natural Gas transport*;

(f) Service providers companies. They support the primary functions of the value chain. They include from construction companies and suppliers of exploration and production equipment to providers of accounting and information management services, financial institutions and law firms, e.g. *Halliburton Company and Schlumberger*;

(g) Shipping Companies. They provide maritime service transport for oil and gas and minerals, e.g. *Maersk;*

(h) Trading companies. By selling and buying oil and gas or minerals commodities, they act as intermediaries connecting supply and demand in the market, e.g. *Glencore, Trafigura;*

(i) Storage companies. Mainly in the oil and gas industry, these companies own and rent facilities for oil, oil products and gas storage to trading companies, refineries or consumer centers, e.g. *Vopak, Oiltanking, Horizon Terminals*;

(j) National companies. These are State-owned oil and gas or mining companies, typically found in major oil/minerals producing nations, e.g. *Saudi Arabian Oil Company, Petróleos de Venezuela. S.A., Sonangol, Sonatrach, Codelco.* They can participate in only one stage of the value chain, be fully integrated or even have interests in other industries out of the extractive sector;

[53] Historically the oil industry has been dominated by a small number of large integrated oil companies. The term “integrated” means that these companies are present in all main stages of the industry from the oil well to the gas pump – they are vertically integrated. The golden era of the large integrated oil companies was the period 1930-1973, when the industry was dominated by the so-called Seven Sisters

(k) Local indigenous companies. Local private sector that are either integrated of in certain segments of the extractive industries and whose performance is perceived as raw model like the OANDO group in Nigeria.

Annex II

Summary of local business and job opportunities of a mining project

Exploration	Feasibility and Planning	Construction	Mine Operation	Closure and Reclamation
▪ Digging and trenching with heavy equipment; ▪ Tree planting; ▪ Construction of camps; ▪ Equipment/ vehicle rental; ▪ Drilling contracting; ▪ Expediting ▪ Transportation and freight services; ▪ Fuel Supply ▪ Camp Services – food accommodation and catering ▪ Labour ▪ Air Support rental ▪ Line Clearing ▪ Laboratory Services	▪ Exploration Business Opportunities	▪ Exploration Business Opportunities except tree planting, construction of camps and line clearing. ▪ Construction trades and services ▪ Heavy Equipment operation ▪ Supplying goods and services	▪ Pre-production Business Opportunities ▪ Contract Mining both underground and open pit ▪ Road Maintenance ▪ Recycling	▪ Exploration Business Opportunities ▪ Building drainage systems ▪ Water sampling and analysis ▪ Water treatment ▪ Dismantling transmission lines ▪ Site security
▪ geologists ▪ geophysicists ▪ scientists ▪ drill operators ▪ pilots ▪ field assistants ▪ camp staff ▪ line cutters ▪ prospectors ▪ samplers	▪ Exploration Employment Opportunities ▪ Accountants ▪ Environmental Technicians	▪ Same as Feasibility except not line cutters, prospectors and samplers ▪ Trades helper ▪ Heavy equipment operators ▪ Warehouse technicians ▪ Administrative assistance ▪ Trades occupations ▪ Safety coordinators ▪ Managers ▪ Engineers	▪ Same as Pre-production ▪ Miners ▪ Blasters ▪ Surveyors ▪ Supervisors ▪ Trainers ▪ Clerks ▪ Computer technicians ▪ Executives ▪ Security officers ▪ Laboratory technicians ▪ Assayers ▪ Human resource specialists ▪ Public relations specialists ▪ Marketing personnel ▪ Nurses ▪ Truck drivers ▪ Photographers	▪ Exploration Employment Opportunities ▪ Trades personnel ▪ Equipment operators and mechanics ▪ Inspectors ▪ Security and First aid personnel

Source: Adapted from http://www.miningguide.ca/.

Annex III

Initiatives to promote transparency in extractive industries[54]

PWYP (see www.publishwhatyoupay.org) is a civil society initiative launched by a coalition of non-governmental organisation in June 2002. It endorses a mandatory approach to revenue transparency, essentially focused on companies' disclosure obligations. PWYP calls for adjustments to existing company laws, accounting standards and/or stock market listing rules to require the country-by-country breakdown of companies' payments to governments. Disclosure should be on an individual company basis.

EITI was launched by United Kingdom Prime Minister Tony Blair at the World Summit on Sustainable Development, in Johannesburg, September 2002. It is a multi-stakeholder process involving (home and host) governments, companies and industry associations, institutional investors and International financial institutions and civil society. EITI is taking a voluntary, two-sided approach to revenue transparency. Essentially, it sets an international standard for companies to publish what they pay and for governments to disclose what they receive. It is based on independent audit, reconciliation and wide dissemination of payments declared to have been made by companies and revenues declared received by governments (in principle on a sector wide, rather than individual company, basis).

[54] From "Teaching material on the economics of commodities production and trade". Diploma in Commodity Trading. UNIGE 2011

APPENDIX – Oil, gas and mining industry activities

(a) Oil and gas industry activities.

The activities in the oil and gas industry are grouped into three main segments: upstream, midstream and downstream. Upstream comprises exploration, development and production; midstream covers transportation and storage; and downstream includes manufacturing of products through oil refining, gas processing and petrochemical processes, as well as the selling of these products to the various consumer markets.

Upstream activities

Upstream activities start with *exploration* stage that comprises the activities of finding oil and gas and assessing its quantity for possible exploitation. Sedimentary basins for oil and/or gas exploration can be identified by aerial or satellite photography and magnetic surveys, and detailed information can be obtained by more expensive means like seismic surveys (2D/3D) and exploratory drilling. When exploration leads to a discovery, the next step is the delineation (fixing the limits) and appraisal of the deposit. The exploration and appraisal process can take 3 to 10 years to complete.

After exploration, if the results and appraisals indicate that commercial production is viable, the *development* stage is carried out. It includes all the activities and investments needed to prepare the site for commercial production: roads, the production wells, platforms, collecting systems, production installation, processing and metering equipment, and an evacuation system. The development stage, before commercial production starts, can take from two to four years depending on the particularities of the project and the region. Likewise, development investments could amount to 40%-50% of the total cost of a project and varies considerably from one region to another, depending on the depth of the objective; the quality of the reservoir and the products (density, viscosity, etc.); and the geographical environment (onshore or offshore).

This development stage is followed by the *production* stage, which comprises all the activities of commercial extraction of oil and gas from the deposit. The hydrocarbons extraction follows a production profile characterized by a build-up, then a plateau that may be maintained for a few months to three-six years (more in the case of large deposits), and finally a decline until the end of the life of the field. The quantities of hydrocarbons recovered from a deposit vary depending on the characteristics of the reservoir and its pressure.[55] The production costs vary depending on the ease of extraction, the size of the field, the geographical situation (on-offshore) and the region. After a period of production of 15-25 years, the limits of economical recovery of the hydrocarbons are generally reached and the production structure is dismantled to rehabilitate the area.

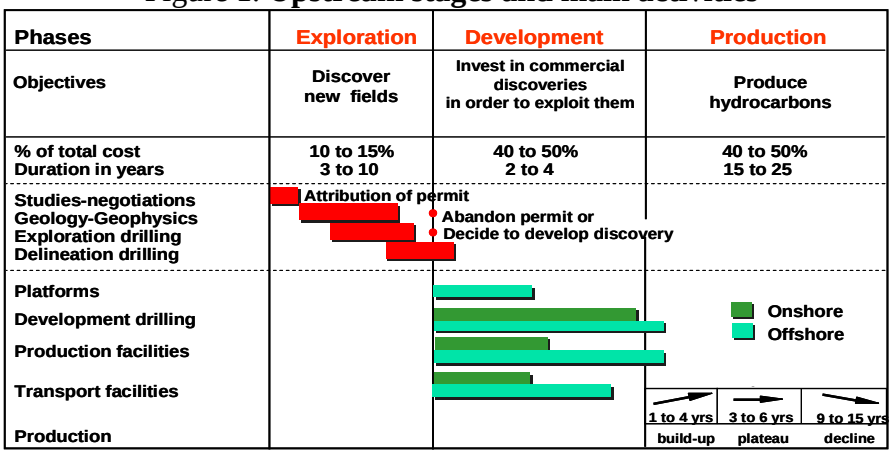
In the case of shale gas, which has now come to world's attention in the energy security debate, energy companies have combined two established technologies to unlock gas

[55] The different recoveries stages are: Primary, using the natural pressure of the reservoir (80% to 90% of gas and 30% to 40% of the oil); Secondary, involves putting artificial pressure injecting water or gas (from 40% to 60% of oil); and Tertiary recovery processes by chemical or thermal methods (5% to 10% of the oil).

resources trapped in shale rock formations, namely hydraulic fracturing and horizontal drilling.[56]

The *decommissioning* of production installations involves the removal of buildings and equipment, the restoration of the site to environmentally-sound conditions, the implementation of measures to encourage site re-vegetation, and the continued monitoring of the site after closure. Normally, the decommissioning of commercial facilities should be planned at the beginning of the development phase and executed at the end of the commercial activity. However, as most exploration wells will be unsuccessful and will be decommissioned after the initial one-to-three months of activity, it is prudent to plan for this stage from the outset.

Figure 1. **Upstream stages and main activities**



Source: Institut Français du Pétrole (IFP). Petroleum Economics and Management training material 2007.

Midstream activities

The midstream sector is composed of assets and services that provide a link between the supply side and demand side of the value chain, and include the activities of *storage* and *transportation*.

S*torage* facility for crude oil is usually large-diameter tanks, generally grouped in large tank farms and connected to ports, hubs or pipeline networks to reach consumer centres. Oil and products are stored at different points along the value chain, not only for consumption but also as inventories for price hedging/speculation purposes. In the case of natural gas, storage is carried out underground in depleted reservoirs, aquifers or salt caverns, and specially conditioned gas tanks.

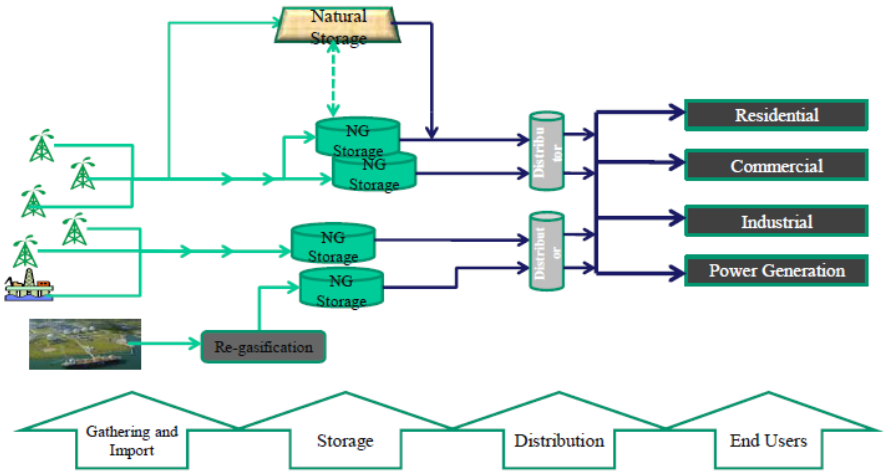
In terms of *transportation*, hydrocarbons are mainly transported by railroad, pipelines and tankers, the last two being the most used means.

Pipelines offer several advantages over other means of oil and gas transport as they are safer, assure a constant flow of the commodity; are relatively cheap to run and maintain; can be used for storage; and allow changes in the flow and amount of cargo transported. On the downside, pipelines are expensive to build and lack flexibility – in the sense that their route

[56] This fracturing production process is being questioned due to the negative environmental impacts associated to it. These include underground water contamination with chemicals, land pollution, and depleting local ecosystems due to vast quantities of water used. There is also concern about the seismic activity involved and the disposal of the sludge waste that results from fracturing.

or the destination of the dispatch cannot be changed once constructed; can raise environmental concerns during construction; they are subjected to security problems (sabotage and theft); and cross border pipelines can involve complex negotiations and legal agreements. In addition pipeline development often requires substantial upfront investment, a clearly identified user (off-taker) and long term contracts/commitments. For natural gas, pipelines are the main mean of connection between producers and end consumers in the supply chain. The pipeline gathers the gas from the production fields and connects them with the processing and storage facilities. From there, pipeline transport the gas to the distribution centers located close to the consumer areas where it is injected to the local gas grid to reach end consumers. As continuous process, the physical balancing of an integrated gas network to enable scheduled transits is a highly complex task.

Figure 2. **Natural gas transport chain**



Source: UNIGE 2011. Introduction to shipping, transportation and logistics teaching material.

Shipping is another form of gas transport which is growing rapidly because of technological innovation that has made possible to convert gas into liquid (Liquefied Natural Gas - LNG).[57] Nowadays, Qatar is leading the global production of LNG and therefore plays an important role in global energy security. In the case of oil and oil products, marine tankers are the most common form of intercontinental transportation. Unlike pipelines, they are flexible in terms of the cargo destination decision, and many of the key ports are located close to the main producing and consuming regions in the world. There are different types of oil tankers depending on the load capacity and the routes they cover.

[57] This process involves three stages: liquefaction of the natural gas (cooling to minus 160°C), transportation in cryogenic tankers (insulated pressure containers) and re-gasification and injection to the local gas grid.

Figure 3. Oil Tankers

Different types of oil tankers	Load capacity	Voyages
Ultra Large Crude Carriers (ULCC)	325,000 to 600,000 dwt	• Gulf --> Europe / Asia • West Africa --> Europe / Asia
Very Large Crude Carriers (VLCC)	> 160,000 dwt	• Gulf ---> West (Caribbean, USA or Europe) • Gulf ---> South East Asia • Suez Canal in ballast
Suezmax	100,000 to 160,000 dwt	• West Africa ---> Caribbean/USA • Suez Canal loaded
Aframax	80,000 to 100 000 dwt	• Regional traffic (North Sea, Mediterranean, Caribbean/USA)

Source: Institut Français du Pétrole (IFP) – Training Material PEM 2007.

Downstream activities

The downstream sector covers the activities ranging from the refining/processing of hydrocarbons to selling to final consumers.

Oil refining is a key part of the value chain, as crude oil must be processed and converted into finished products for consumption. Through this process, hydrocarbon molecules are separated and oil is transformed into different products for their final use in transportation, residential and commercial heating, power generation, petrochemical production and asphalt elaboration. Refineries consist of a number of different processing units that undertake the separation, conversion and treatment of oil.

The *processing of natural gas* consists of separating the various hydrocarbons and fluids from the wellhead gas. The processing opens a wide range of commercial opportunities for natural gas like: piped natural gas (methane) which is sold directly to end consumers through pipelines; natural gas (methane) as a feedstock for fertilizers production, natural gas liquids (NGL) ethane, propane, butane, pentane, which are sold to the petrochemical industry and wholesale and retail clients; gas-to-liquids (GTL) which converts natural gas into valuable transport fuels (gasoline, diesel), naphtha and oil for lubricants; and also, by liquefaction the natural gas (LNG) it can be transported in tankers to reach distant markets.

Regarding *marketing*, after refining and processing, oil products marketing includes the activities necessary to sell and deliver refined products to end consumers through wholesale, direct industrial sales and retail in petrol stations. Marketing activities are generally performed by international or local integrated oil companies, specialized distribution companies, and increasingly by petrol stations chains, supermarkets as well as retail firms. Likewise, the natural gas is sold to end-users, mainly for heating, power generation or transport. The distribution of piped gas is usually done by utility companies, but petroleum firms also participate in longer-distance transmission and direct deliveries to big end users.

Oil refining and gas processing provides the raw material for the *petrochemical industry*. Oil refining streams like naphtha, propane and butane, and products of natural gas processing like methane and NGL are the main feedstock for the production of petrochemicals. The petrochemical industry requires certain minimum plant dimensions to achieve economies of scale, and the volume available is a key element to establish a petrochemical industry based on natural gas production. In oil and gas importing countries, naphtha from oil refineries is the most common feedstock. Because of the advantages of logistical proximity, petrochemicals plants are located close to refining plants and are often connected to them by pipeline.

(b) Mining industry activities

The activities in the mining process can be classified into extractive related, which involves exploration, development and mining; and processing related, which encompass processing or beneficiation, smelting and refining, other added value activities; and transport and storage.

Extractive-related activities

Exploration represents the first stage in mining. It includes all the activities leading to the discovery of resources. It starts with the use of surveying methods that cover large areas and that may consist of i) satellite pictures; ii) airborne geophysical surveys; or iii) sparse grid ground geochemistry based on soil or water samples. When a zone of interest is detected, prospection takes place on the ground and once there is a certain degree of confidence in the existence of minerals, drilling is required to determine the shape and nature of the deposit.

The exploration stage is dominated by small independent companies (junior companies), that employ a few professional geologists. They usually operate either through joint ventures, or total out-sourcing, and obtain their financing from equity markets. They cover the value chain up to the level of pre-feasibility studies so as to sell their discoveries to investors. Although majors companies (fully integrated companies) do perform exploration activities, junior companies have made most of recent discoveries. Majors are less willing to take risks and prefer to buy deposits already discovered by junior companies, or simply focus their efforts on searching for large deposits. The total cost of exploration stage, before the construction of the mine can begin, may vary from $20 million to over $150 million, and it can take 3 to 10 years before feasibility decisions are made.

If it appears likely that exploitation is possible, the *development* stage begins with the preparation of a feasibility study and the construction of the mine. The objective of this study is to determine the method of exploitation and, with a high degree of confidence, the cost of production. A feasibility study is generally necessary to obtain the financing and the permits and licenses to develop the deposit (the planning and feasibility stage of a mine can take 2-7 years). The mine construction starts after all the permits and regulations have been confirmed.[58] It includes the construction of the mine itself, the processing plant, roads, rails, sewer and water lines, and housing to support the operation. The construction phase requires the largest amounts of investment –it can range from $100 million to $3 billion – and can take two to four years. [59]

The *mining* stage starts with the commercial exploitation of the mine and consists in the removal of the mineral value in ore from the host rock or matrix. Mining can be classified in two types or extraction methods: surface mining (open pit or open cast) and underground mining. While the choice of method depends on the size, shape and depth of the ore body, all operations involve the basic steps of ore breaking, loading and hauling to a mill for treatment.[60]

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[58] Process that can take several years for large deposits with significant environmental or social impacts.

[59] From http://www.miningguide.ca/ - Accessed in January 2012

[60] Surface mining is used to excavate ores at or close to the Earth's surface, and where feasible, it is preferred, since the engineering is less complicated and costs can generally be kept lower. Surface mining can be highly mechanized and may require relatively few employees; hence it has better safety records than underground mining. Underground mining is used for deeper deposits or when too much waste material has to be removed in proportion to the mineral's value. In fact, some projects start off with surface mining and then go underground as the deposit gets deeper. Furthermore, due to the smaller facility footprint and the lower quantities of non-ore

Finally, when commercial activity reach to an end *decommissioning* and *mine closure* activities must be carried out. The time needed to shut a mine varies from 2-5 years; normally, the bigger and more complex the operation, the longer it takes to close. The process of mine closure must take into account the shut down notifications, by means of which stakeholders are informed that production is going to end; the decommissioning, which comprises removing buildings, sealing of underground openings and monitoring of water and waste rock; and reclamation, which can involve re-contouring the ground, capping it with growth medium, and then seeding and fertilizing it. After reclamation, a period of monitoring of the site must be considered.

Complete closure cost could be significant, and vary from a few million dollars for a small company to over of $100 million for a large mine.

Processing-related activities

After mining, the *mineral processing* or *beneficiation* stage involves the activities to separate the mineral from waste material, remove impurities, or prepare the ores for further refinement. This beneficiation process is usually completed at the mine and its purpose is to yield a product that has a much higher content of valued material. After grinding, valuable minerals are separated from the waste through physical (milling) methods (gravity, magnetic, electrostatic and flotation) or chemical methods (mainly leaching). The result of the beneficiation stage is generally a mineral concentrate which contains elevated levels of base and/or precious metals and requires further metallurgical processing before a final product can be shipped to the market.

Following beneficiation, the concentrates are shipped to *smelters or refineries* to further extract and/or refine the metal, thus preparing it for its final use or for incorporation into physical or chemical manufacturing. The impurities found in crude metals may have value in themselves; the gold and silver recoverable from copper, for example, may pay for the entire cost of the refining process.[61]

Finally, the *value addition* activities include the metal working industries that process pure metals, forming it into commercially traded shapes such as ingots or cathodes. These are then turned into semi-fabricated products such as sheets or plate, bars and tubes and, finally, manufactured into machine components, instruments and tools needed by other industries and sectors of the economy.

Transport and storage

As mineral deposits can be located in remote places, *transport and storage* activities play a mayor role in carrying the minerals from one stage of the value chain to another.

Transportation of ore and concentrates can be done by sea, rail and road. Besides location, transportation is also dependent on the mineral characteristics. In the case of low value bulk minerals transportation can represents a high percentage of the consumer final cost. Minerals are shipped in dry bulk vessels for long distances, and in barges in rivers and channels. As vessels and barges can ship different bulk commodities such as coal, iron ore and bauxite, the

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that have to be removed and disposed as waste, underground methods have less impact on the surface environment than surface methods.

[61] The most common forms of refining include: pyrometallurgical processes, which use heat to separate the metals contained in the concentrate and hydrometallurgical processes, which use chemicals at high pressures to leach metals from the concentrate.

rates and availability can vary a lot and are heavily dependent on the conditions of the different mining markets.

Figure 4. **The dry bulk shipping market**

Class of Bulk Carriers	Commodities (percentage of total shipments)				
	Iron ore	Coal	Grain	Bauxite & Alumina	Phosphate Rock
Capesize	70	45	7	-	-
Panamax	22	40	43	45	20
Handy class	8	15	50	55	80

Source: UNIGE 2011. Introduction to shipping, transportation and logistics teaching material.

Rail-transported minerals are typically moved in unit trains that operate in dedicated shuttle service between a mine and a destination. Because rail systems exhibit economies of scale, there is a tendency toward consolidation, manifested either in State ownership or merger of privately owned systems into a handful of competitors. High barriers of entry allow the exercise of monopoly power, which has been a persistent issue in nations with deregulated rail industries, such as the United States and Canada.

Truck transportation is used to move ore to a transloader for placement onto a water or rail carrier, or for direct shipment to the customer in the case of refineries. Trucks have the advantage of routing flexibility and modest capital requirements. They are used mainly for shorter distances due to the high unit cost of moving generally low-value products in relatively small quantities (compared with rail or barges).

Storage is necessary at several points in the mining supply chain. Because minerals are transported mainly in batches (e.g., a unit train or a vessel), rather than moved continuously through a network like natural gas, the supply chain must accommodate surges and lulls in demand at the mine; at the origin and receipt dock or port for water shipment; and at the end user, such as a power plant in the case of coal. Some minerals must be carefully handled, and storage must consider their specific characteristics to avoid problem to the environment or the hazards of damage to the quality of the mineral. For example, improperly stored coal can oxidize (weather), causing a loss of heat content, and if heat is allowed to build up in a stagnant coal pile (or in a vessel, barge, or railcar) the coal can self-ignite.

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