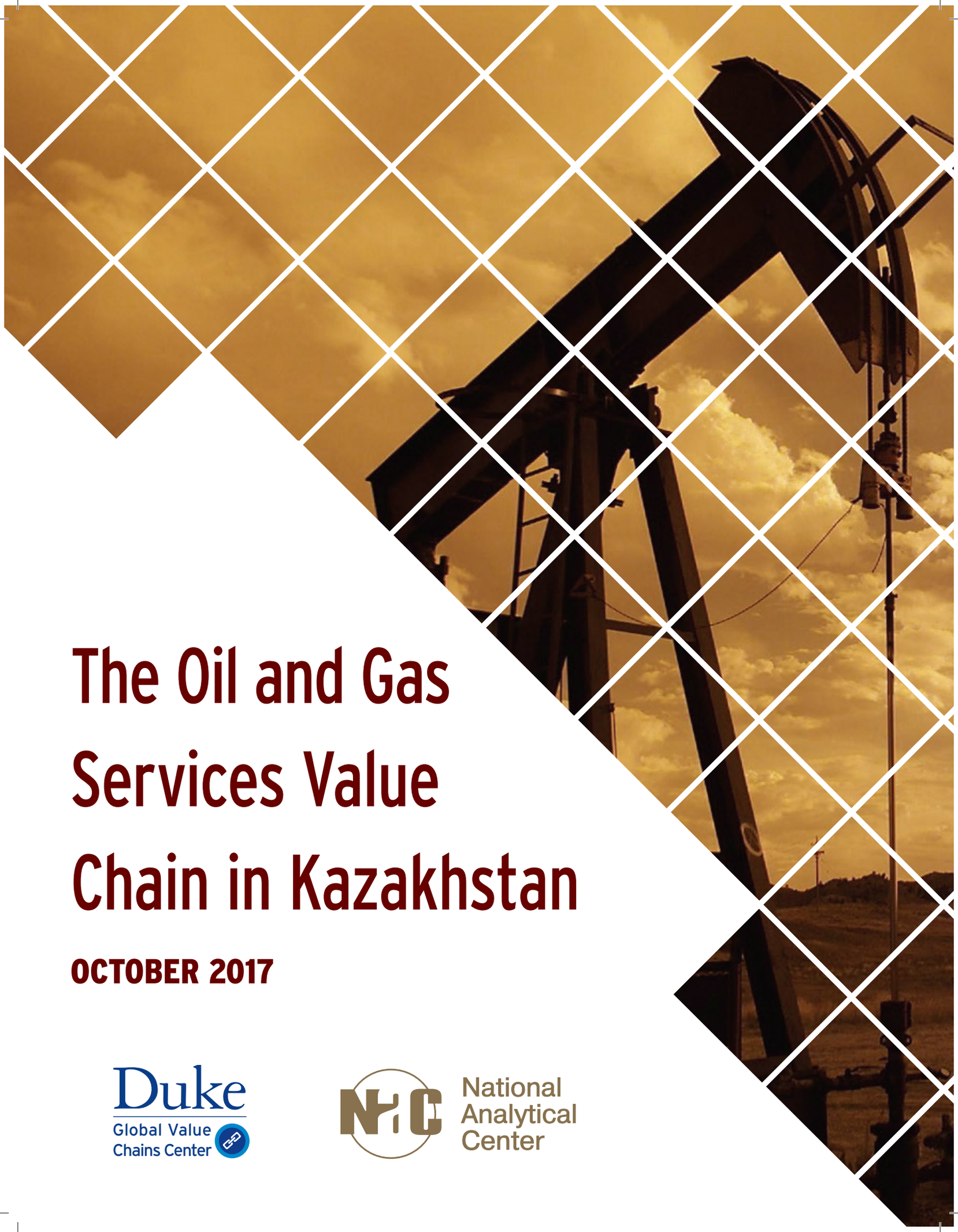

The Oil and Gas Services Value Chain in Kazakhstan

OCTOBER 2017

Duke Global Value Chains Center

National Analytical Center

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This research is prepared on behalf of the partnership between the National Analytic Center (NAC) at Nazarbayev University in Astana, Kazakhstan and Duke Global Value Chains Center (GVCC) at Duke University in Durham, North Carolina, USA. The partnership aims at fostering collaboration in value chain research to advance Kazakhstan's economic performance and participation in Global Value Chains (GVCs).

Acknowledgments

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Nazarbayev University, National Analytic Center (NAC)

National Analytical Center is a research institute of AEO "Nazarbayev University" in the area of socioeconomic development. Its analytical work emphasises studies of the Republic of Kazakhstan, Central Asian region and China. The Center works in close collaboration with leading world experts and other research institutes, international organizations, government bodies and businesses.

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Duke Global Value Chains Center (Duke GVCC)

The Duke University GVCC undertakes client-sponsored research that addresses economic and social development issues for governments, foundations and international organizations. We do this principally by utilizing the global value chain (GVC) framework, created by founding director Gary Gereffi and supplemented by other analytical tools. As a university-based research center, GVCC addresses clients' real-world questions with transparency and rigor.

www.gvcc.duke.edu

Global Value Chains Center, Duke University.

List of Acronyms and Abbreviations

BTU – British Thermal Units
E&P – Exploration and Products
GCEA – General Classification of Types of Economic Activities
GVC – Global Value Chain
GVCC – Global Value Chains Center
IOC – International oil company
LCR – Local Content Requirements
NAC – National Analytical Center
NOC – National oil company
OECD – Organization for Economic Co-operation and Development
PSA – Production sharing agreement
R&D – Research and Development
RK – The Republic of Kazakhstan
UN – United Nations
UN Comtrade – United Nations Commodity Trade Statistics Database
WTO – World Trade Organization

Contents

Executive Summary

Oil is the most traded item on the planet. The oil and gas industry is truly global and feeds into the majority of human activities. The oil and gas industry has been the backbone of the rapid economic development in Kazakhstan in the 2000s. However, reliance on commodity production is not a sustainable national economic strategy for many reasons, including susceptibility to currency fluctuations, exposure to external shocks, and limited opportunities for employment growth. From a development perspective, commodities can be used as a platform to build on existing competitive advantage and develop opportunities to increase local participation in the production chain. This report identifies Kazakhstan's position and upgrading trajectories in the oil and gas global value chain (GVC), drawing on best practices of resource-rich countries.

The key finding of the report is that the oil-field services subsector generates most of the value and develops most of the innovations in the oil and gas GVC. The dynamics of the oil and gas value chain are determined by a tiered system of lead firms and suppliers that historically have created a tight network of companies. To be competitive in the chain dominated by multinational lead firms, suppliers must demonstrate the capability of its workforce and technical capacity to meet lead firms' standards. The task of the host country is to remove barriers for local firms to participate in the chain and to design its supporting policies accordingly. For Kazakhstan, as the study finds out, expanding participation in the value chain means improving the quality of its human capital so local companies are able to move into more sophisticated services, and to alter its local content policies so that Kazakhstan's companies can enter the production portion of the chain, gradually expanding their participation in the global industry.

Best international practices suggest that a participatory approach to industry challenges and local capacity building are essential for the development and implementation of successful government policies. The report reviews the human capital development and local content policies in the U.K., Norway, Canada, Australia and Russia to identify international best practices. Given the high level of participation of the Government in the industry through regulation and the national oil gas company—KazMunayGas—the recommendations are as follows:

- Create a comprehensive workforce development strategy with participation of all stakeholders. Connecting educational institutions with private sector in a meaningful way, improving teaching standards and establishing opportunities for lifelong education are important elements of such strategy.
- Set a coherent policy framework and institutions to promote upgrading and local participation in the industry, instead of market distorting percentage targets. Local oil-field service industry needs capability development tools (for instance, business skills training), improved access to finance, support in technology transfer and export efforts. Besides, liberalization and increase in transparency of policy-making, licensing and procurement practices are paramount to enhance the efficiency of the local industry.

1. Introduction

Globalization became a buzzword in the late 20th century and, despite rising waves of protectionism, remains embedded in the way economies function today. Fragmentation of global production and intensification of trade flows induced new thinking around the phenomenon. Researchers from various fields study global "integration of trade" and "disintegration of production," focusing on strategies of firms and countries. One of the structured frameworks to understand global industries and development opportunities is the GVC framework developed by the Center on Globalization, Governance and Competitiveness at Duke University, which seeks to identify a country's (or a firm's) potential to advance in a particular value chain (Gereffi 2005; Gereffi 2001).

The fragmentation of production processes and a significant increase in the number of buyers, sellers and intermediaries resulted in the emergence of different patterns of distribution of power and profits between them. The GVC methodology analyzes the industries' economic geography, the linkages among the stages of value creation, the governance structure of the supply chain and strategies to capture more value. (Sturgeon 2008).

Thus, GVC analysis covers all activities related to production of goods or services, from raw materials to factors of production, delivery for final use and post-sale services, if relevant (Cattaneo 2010).

In today's interconnected global economy, the question that countries face is not whether to participate in global production chains, but how to participate effectively. Applying GVC analysis is essential for a small open economy such as Kazakhstan that recently joined WTO in 2015. The country developed a strong dependence on a single commodity; in 2015, crude oil accounted for 59 percent of its total exports. The prolonged decline in oil prices has had a major impact on Kazakhstan's economic performance, with a subsequent decline in the rate of economic growth from 6 percent in 2013 to 4.2 percent in 2014 to 1.2 percent in 2015, and finally to 0.4 percent in the first nine months of 2016. The decline in economic performance due to reduced oil prices has once again accentuated the need to diversify the country's economy and exports.

Understanding how GVCs operate and mapping Kazakhstan's position in them is critical for a developing country that seeks to create jobs, attract foreign investments, increase productivity and generate higher value within the country. There are six different trajectories for a country or a firm to "upgrade" or expand in GVCs (The Philippines 2016). Use of a concrete upgrading strategy in GVCs depends on leveraging existing competitive advantages, including geographic location, human capital, and potent local suppliers.

GVC frameworks feature the following upgrading trajectories. Changing one's position in a GVC starts with entry into the value chain; as knowledge accumulates, product upgrading means creating a more sophisticated product with a higher value; process upgrading means efficiency enhancement in production processes; functional upgrading describes acquisition of new skills to move into higher value segments of the chain; chain upgrading leverages accrued knowledge and technology to move into another value chain; and, finally, end-market upgrading means entering new, higher value, premium markets (GVC Primer 2016). GVC analysis helps identify the best trajectory for upgrading given local capabilities, and provides opportunities for development that do not solely rely on functional upgrading, which in many developing countries may not the optimal strategy to pursue, at least in the short term, due to local company capabilities (The Philippines 2016).

The aim of this study is to consider opportunities for Kazakhstan's greater participation in the global oil industry. The report examines the distribution of value across the oil and gas value chain, the existing governance model between lead firms and suppliers, the geographic distribution of production and trade flows, and the institutional structure of the oil and gas value chain.

The report is structured as follows: First, it analyzes the world oil and gas industry from a GVC perspective, covering the chain's key elements, its global distribution, the role of lead firms and the role of standards. Then, the study considers upgrading—an important concept in GVC analysis—and the upgrading trajectories that oil producers undertook. The fourth part of the report continues to upgrading potential of the oil-field service industry. Based on the analysis, the final part of the report draws some key policy recommendations, which take into account institutional environment and important role of the Government in the sector.

2. Methodology

This report draws on two analytical components: **"desk research"** and **"field study"**. Box 1 provides a detailed description of the methodology and its components. The first component includes analysis of academic and business literature. The second one builds on interviews with industry stakeholders—oil and oil-field companies, industry associations, government bodies and education institutions, in Kazakhstan and abroad.

Box 1. Global Value Chain (GVC) Methodology

GVC analysis includes all the activities conducted by firms which are necessary for the production of goods and services and their delivery to the final consumer. These activities can be carried out by one or more firms, and includes research and development, design, production, marketing, distribution and final sale. A chief purpose of GVC analysis is to identify opportunities for economic, social and environmental upgrading.

The GVC methodology is based on the analysis of **six main dimensions** *that are divided in global and local. Global dimensions analyze the industry dynamic at the international level, and local elements examine the country's participation in GVC.*

Global dimensions include:

(1) Input-output structure (production factors—products) defines the process of transforming raw (source) materials into a finished product or service. *The input-output structure considers the range of steps needed to create a product (or service) from raw materials, to component production and final assembly, to delivery to the final consumer. This dimension takes into account main and subsidiary activities and tangible and intangible goods and services. The components of the chain differ depending on the industry. In general, they may include research and development, engineering and design, materials, manufacturing and distribution, marketing and final sales. After-consumption disassembly or disposal is often considered. The analysis of each segment of the chain shows its contribution to formation of the product's value added.*

(2) Geographic scope analyzes the industry's presence in other countries. *The main goal is to understand the geography of trade in the global industry, especially the key importing and exporting countries, and shifts over time. Geographic scope considers supply and demand at the global level based on global trade flows from international statistical databases. In additional, various industry publications, firms' reports, expert opinions and other sources are analyzed to understand key trends. Geographic scope can be considered on local, national, regional and global levels.*

(3) Governance structure: Lead firms & industry organization defines the source of control in a GVC. *Examining the governance structure of an industry helps to understand the relationship between firms in the chain, especially with regard to its coordination and control functions. This phase of the analysis identifies the lead firms in the industry and other information, including their location, interaction with suppliers and customers, and enforcement action such as standards and other regulatory documents. There are five key industry governance types: market, modular, relational, captive and hierarchy, which are determined by three factors: the complexity of the information shared between actors in the chain; how the information for production can be codified; and the level of supplier competence:*

- **Market governance** *assumes that operations between various players are carried out easily, the specification of goods is simple, and producers can create a product without close contact with the buyer. The price of a product is a major factor, and buyers are not connected with suppliers formally through long-term contracts or in other forms.*
- **Modular governance** *prevails in chains where transactions are relatively easy to codify. Producers manufacture products in accordance with the requirements of a large number of customers,*
- **Relational governance** *is formed when complexity of the data used by sellers and buyers in transactions complicates their transfer or complicates training. Establishment of such communications is based on reputation, geographical or cultural proximity, or affinity. In such a model, leading companies have a greater influence on the suppliers than vice versa.*
- *In* **captive governance** *the leading companies-buyers are usually small in number, and suppliers are numerous; therefore, the formers have a significant influence on the latter by conducting monitoring of their activities and dictating terms of cooperation (GVC Primer 2016). The reason is that the lead firm controls creation of complex products with strong characteristics in case of low supplier competence (Gereffi et al. 2005).*
- **Hierarchical governance** *usually emerges in vertically integrated chains, which are controlled by the lead multinational companies. Products and services are developed and produced within one company. This usually occurs in a case where the technical specifications of this product have a high degree of complexity, information is very difficult to codify or there are few other qualified suppliers in the market.*

Local dimensions include:

(4) Upgrading improves the position of a firm (or country) in a value chain. *When analyzing opportunities for upgrading, the following types of upgrading are taken into consideration:*

- *Process upgrading: more efficient transformation of inputs into outputs by reorganizing the production system or the introduction of improved technologies.*
- *Product upgrading: transition to more difficult manufacturing lines.*
- *Functional upgrading: acquisition of new functions to increase the general of skills of activity (Humphrey et al. 2002)*
- *Chain or intersectorial upgrading: entry into a new chain due to the knowledge and skills received in the current chain.*
- *In GVC literature the next types of upgrading are determined:*
- *Entry into the value chain: the start of participation in a GVC.*
- *Improved backward linkages: the ability of local firms (domestic or foreign) to produce formerly imported goods in a GVC.*
- *End-market upgrading: entry into the market with higher value added, for which a geographical or a sectorial shift may be necessary.*

Recently, the literature has begun to quote other types of upgrading, including social and ecological upgrading.

*(***5) The analysis of institutional context identifies the influence of local and international policies on globalization processes in each segment of a chain**. *Participation of companies in global industries is associated not only with the ability to produce to buyers' standards, but with the regulatory and organizational support structure that constitutes the economic, social and environmental context of production. Formal legal requirements on a variety of economic, social and environmental topics, including those that facilitate the development of physical and human infrastructure, are important for many GVCs. Organizations relevant to GVCs include industry organizations, educational institutions, and regulatory bodies.*

(6) Industry stakeholders. *Industry stakeholders include all participants in the value chain. Analysis of stakeholders' role in industry GVC is also carried out. Such approach allows for identifying of how various characteristics of institutional environment (in the different countries and regions) influence economic and social indicators. (GVC Primer 2016).*

The first stage—desk research—utilized industry reports and statistical databases such as UN Comtrade Statistics Database, U.S. Energy Information Administration and BP Statistical Database. Specifically, the six-digit SITC codes were used to identify direction and dynamics of global trade flows in oil, gas and oil-based products. The data on Kazakhstan's production, processing and international trade in hydrocarbons and refined oil products comes from the national Statistics Committee. All data was drawn for 2000-15. Trade data included volumes, dollar value and destinations of flows.

The second stage – field research – occurred after understanding the global hydrocarbon value chain functions and Kazakhstan's place within it. To better understand the oil and gas industry, its bottlenecks and potential upgrading trajectories in Kazakhstan, NAC conducted a survey with industry stakeholders. The list of interviewees included ministries of energy and investment and development, foreign and Kazakhstan oil-field service companies, scientific research institutes, information and analytical centers, education institutions in Kazakhstan and the U.S., and the Nova Scotia Department of Energy (Canada). In addition, meetings were held with industry associations and experts in the energy sector and oil and gas service. Specific questionnaires were developed for each group of respondents.

Having described the methods used to develop the insights and recommendations, the report now turns to the analysis of the oil and gas GVC and Kazakhstan's participation in the chain.

3. Oil and Gas Global Value Chain

3.1. Industry Trends

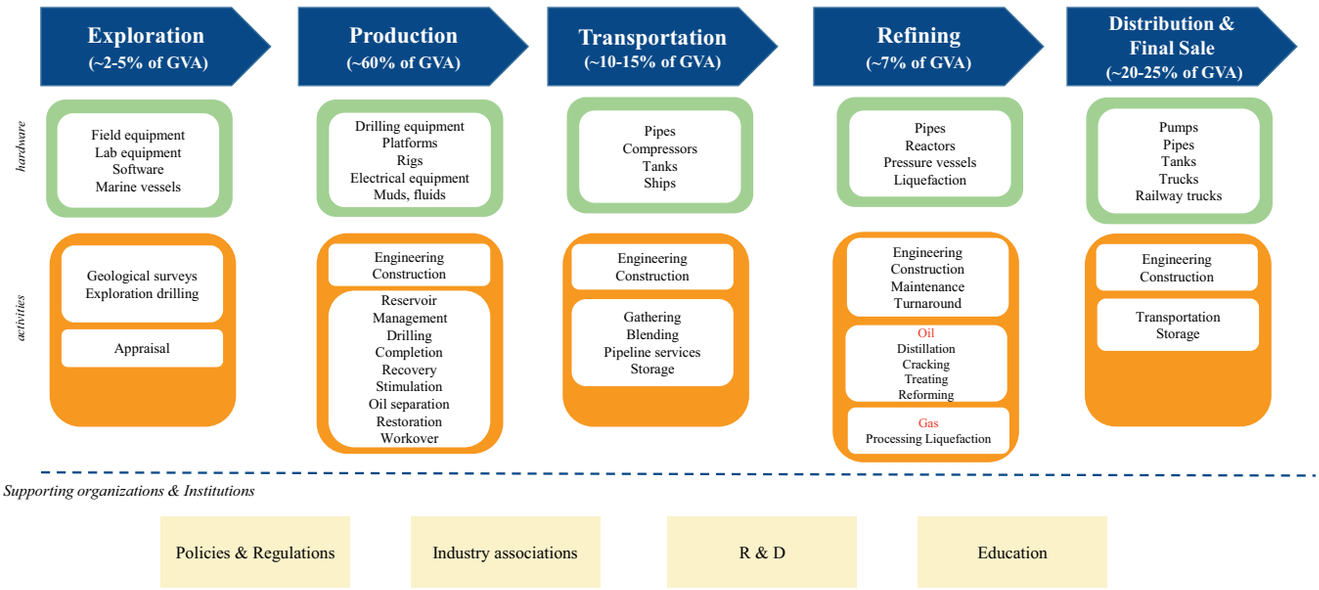
Current trends in the oil and gas value chains are determined by technological developments and shifting geography of consumption from the developed West to developing East.

1. **Advancement of technology made large "unconventional reserves" available at a competitive price**. Market disruption of 2014-15 induced fundamental transformation of the oil and gas industry. North America has become an exporter of hydrocarbons, and world supply of oil has greatly increased.
2. **Global demand shifts to the East**. China, India and Japan combined account for 40 percent of world oil imports. The rest of Asia has also increased its consumption of fuels as economies grow and people's incomes rise.
3. **Environmental policies and the development of renewable energy create downward pressure on oil and gas prices**. Hydrocarbon producers are diversifying their energy portfolio away from oil and are turning into energy producers, more generally.
4. **However, the current drop in investments will eventually push prices up**. Oil and gas producers seeking to optimize production costs, have frozen their investments in complex and expensive projects. As a result of growing competition, not only among oil producers but with other sources of energy, industry margins will remain tight. Decreased upstream investments for the last two years likely will not lead to the same comfortable level of margins as in 2011-14 (International Energy Agency 2016).
5. **A global talent gap is emerging due to the industry's cyclical nature**. A large number of aging professionals are leaving the industry while the education system, also prone to cyclical booms and busts, does not produce an adequate volume of graduates. New industries such as IT, high-tech and finance became more attractive to talented youth in the 2000s.

3.2. Value Chain Overview

Key segments of the oil and gas value chain are exploration, production (or extraction), storage and transportation, refining, and marketing and distribution. Each of the segments involve a number of activities and employ a range of factors of production (Figure 1; percentage of value added at each stage of the chain is shown in parentheses). Supporting organizations and institutions create an environment under which oil and gas companies operate. Their quality and nature has significant influence over configuration of the chain, the way it functions and, largely, upgrading trajectories.

Figure 1. Oil and gas value chain[1]



Source: NAC

1. **Exploration** aims at searching for the hydrocarbon reservoir beneath the Earth's surface.
2. **Production** (extraction) is the process of bringing the hydrocarbons from the reservoir to the surface.
3. **Transportation** of oil and gas includes movement from the oil and gas fields to processing facilities and from those facilities to the end market.
4. **Refining** is an industrial process converting hydrocarbons into fuels, lubricant oils and petrochemical feedstock.
5. **Distribution and final sales** include branding petrochemical products and delivering them to customers via marketing base—directly to industrial or residential customers, gas stations or petrochemical plants.

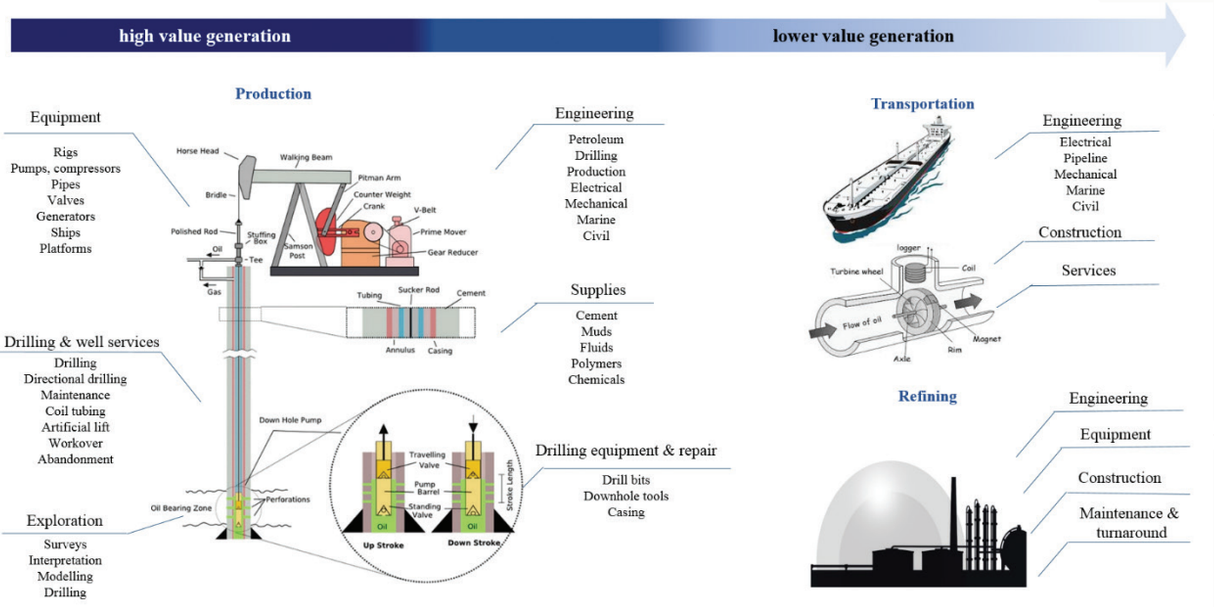
Exploration and Production (E&P) segments are referred to as **upstream** oil and gas. Infrastructure such as transport (pipelines, access to roads, rail and ports, etc.) and storage are critical at various stages in the value chain, including the links between production and processing facilities, and between processing and final customer. These parts of the value chain are **midstream**. Refining and Distribution (R&D) and final sale are referred to as **downstream** (World Bank 2011).

[1] The share of each segment in the total sector value added is calculated based on Kazakhstan's gross value added statistics for the oil and gas industry in 2015.

Notably, R&D are crucial in all segments of the value chain, with distribution and final sale as probably the only exception. R&D inherently matter for a complex and hazardous activity of hydrocarbon extraction, transportation over long distances and treatment.

The oil and gas industry is very capital-intensive and involves many direct (such as drilling, recovery or equipment manufacturing) and complimentary activities (such as construction, chemicals, etc.). Production segment is where the most value is created [2], while the rest of the segments depend on a steady supply of oil and operate on economies of scale. Thus, when moving into midstream and in downstream segments, the value created per barrel becomes lower (Figure 2). Major production companies, for instance, Royal Dutch Shell makes two-thirds of its profits from E&P of crude despite being vertically integrated structures (petroleum.co.uk). Besides, prices in the midstream and downstream segments are sticky, often regulated for social reasons, and their margins are determined by the fluctuations in oil price (Seba 2008).

Figure 2. Oil and Gas Production System



Source: NAC

The production phase is typically operated by large multinational companies (MNCs) companies, which are the lead in the industry—such as *ExxonMobil, BP, Chevron, Sinopec, Royal Dutch Shell, PetroChina, Saudi Aramco, Total*, etc. Historically, oil companies started as production units and then integrated vertically along the value chain to ensure access to transportation routes, refining facilities and consumer markets. These firms often outsource temporary activities such as drilling and well service to smaller service companies in order to decrease MNCs' costs.

3.3. Geographic Scope

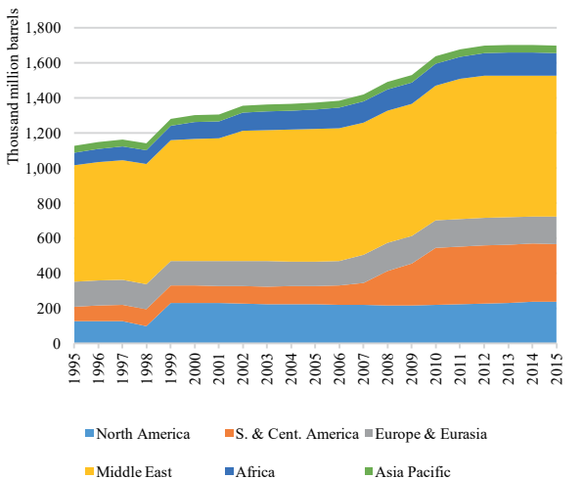
While the Middle East remains the largest oil producing and exporting region, it gradually loses its influence over the global oil market. The Middle East possesses almost half of global oil reserves (with Saudi Arabia possessing 15.7 percent of global reserves) and accounts for 32 percent of global oil production (Figure 3). However, due to the U.S. boom in shale production, the market share of OPEC, members of which are mostly Middle Eastern countries, is declining and is estimated to fall by 5 percent by 2018 as the U.S. supply picks up (Lawler 2014).

[2] Hypothesis regarding highest marginal value per barrel in production is validated in literature, personal communcations with industry experts and statistical data from Kazakhstan's GDP data.

The U.S. has become a decisive producer of oil and gas. Figure 4 shows that U.S. shale production picked up recently, replacing a significant part of petroleum imports. Since 2010, the U.S. completed roughly 20,000 new shale wells (Economist 2014). The country's export of oil products rose from 4 to 13 percent of the world's export volume over the past decade, having a profound effect on the global market. With the lift of the U.S. ban on crude oil export in December 2015 (BBC 2015), the country has the potential to further increase its export of hydrocarbons and oil-based products.

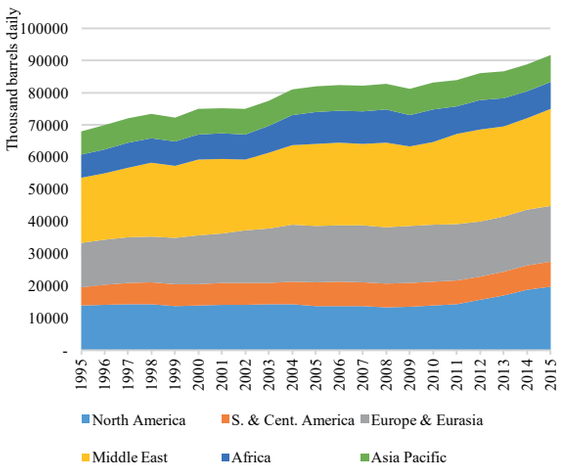
Global supply is becoming more diversified. "Newcomers," in addition to the U.S., demonstrate strong growth of oil production. Brazil has increased its oil production by 52 percent over the past decade. Post-Soviet Kazakhstan and Azerbaijan aggressively increased production as well. Kazakhstan doubled production since the beginning of 2000s, and Azerbaijan almost tripled it (BP 2015).

Figure 3. Oil Reserves



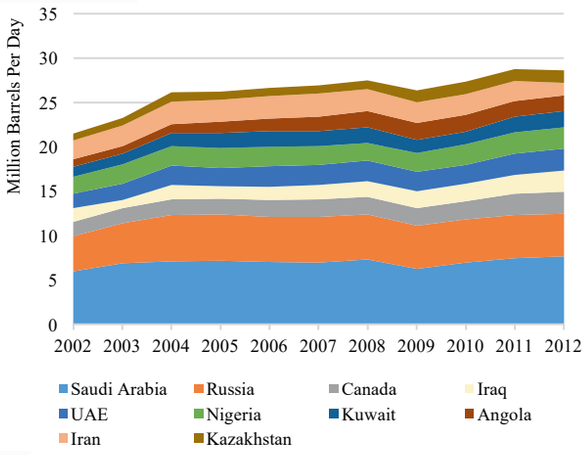
Source: BP Statistical Review 2016

Figure 4. Oil Production



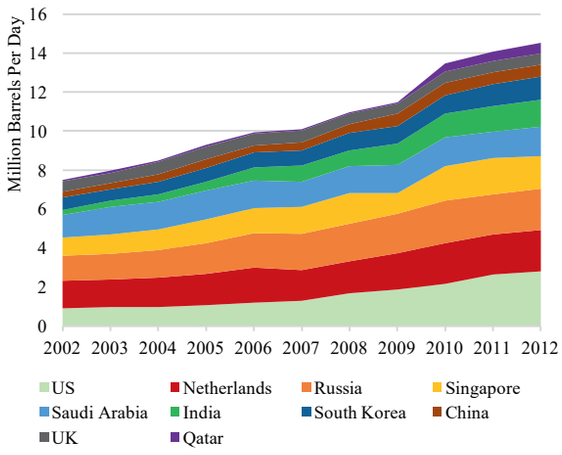
Source: BP Statistical Review 2016

Figure 5. Crude Oil Export



Source: U.S. Energy Information Administration

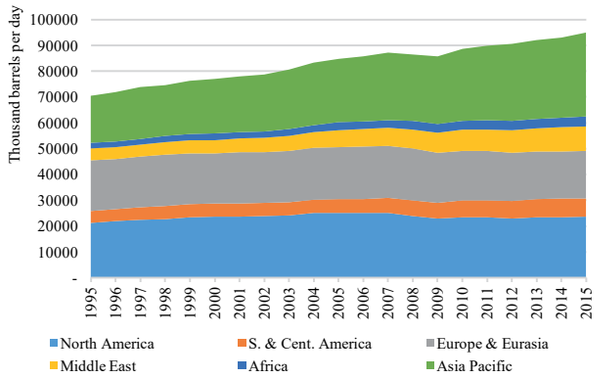
Figure 6. Refined Oil Export



Source: U.S. Energy Information Administration

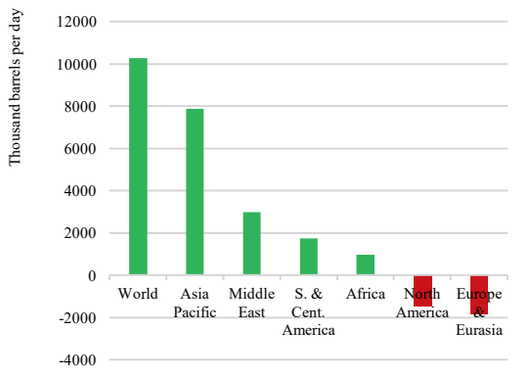
While Europe and North America decrease consumption, developing regions emerge as new consumers of hydrocarbons. Figures 7 and 8 show that the highest increase in demand for oil comes from Asia Pacific, comprising 34 percent of the world demand in 2014. The growth is led by China (12 percent), followed by Japan (5 percent) and India (4 percent). The demand is growing with stable 4 to 6 percent pace annually over the past decade, with a decline to 1 to 2 percent growth rates during economic activity slowdown in 2008-09 and 2013-214. Thus, due to the rapid urbanization of Asia Pacific, and respective vehicle ownership growth, the region has accounted for ¾ of the world's consumption growth over the past decade (Lukoil 2013). Forecasts maintain this trend up to 2040; in the next five years almost half of growth in global oil demand will come from China (IEA 2015).

Figure 7. Oil Consumption by Region



Source: BP Statistical Review 2016

Figure 8. Change in Oil Consumption, 2005-15



Source: BP Statistical Review 2016

Despite global scale of the industry, trade in hydrocarbons, particularly refined products and natural gas, is mostly regional due to higher transportation costs.[3]Russia and the Netherlands deliver refined oil to European countries; Singapore and India sell oil products to neighboring Asian countries and to the U.S. Qatar exports natural gas to Asia Pacific, and Russia and Norway, to other European countries (Table 1).Trade in natural gas remains regional, due to the continued dominance of pipeline transportation.

Table 1. Regional Trade in Refined Oil and Natural Gas

Refined Oil		Natural Gas	
Supply	**Demand**	**Supply**	**Demand**
US	Mexico, Canada, Latin America	**Qatar**	Asia (Japan, South Korea, India, China)
Russia	Europe (Netherlands, Belgium, Italy), US	**Russia**	Europe (Ukraine, Italy, Belarus, Slovakia), Japan
Netherlands	Europe (Germany, Belgium, UK), US	**Norway**	Europe (Germany, UK, Belgium)
Singapore	Asia, Australia	**Algeria**	South Europe (Spain, Italy, Portugal, France)
India	Asia, US	**Netherlands**	Europe (Germany, UK, Belgium, France)

**Top-5 exporters and their major customers of hydrocarbons*

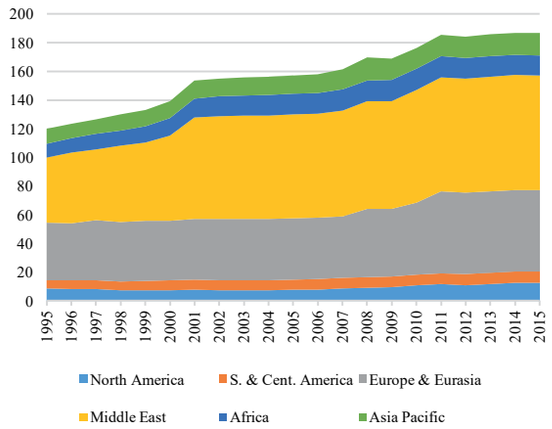
Source: UN Comtrade, HS-Codes 2709 for crude oil, 2710 for refined oil, 2711 for natural gas

Due to the U.S. shale revolution, the global natural gas market undergoes fundamental transformation as well. While 43 percent of the world's total gas reserves are in the Middle East (Figure 9), Russia is currently the largest natural gas producer and exporter—with 30 percent of world's production and 20 percent of world's export. However, the U.S. shows a rapid increase in natural gas production—43 percent over the past decade (Figures 10 and 11). Today, the country is the second world's producer of gas in the world, with 21.4 percent share (EIA 2015). Moreover, the U.S. can start exporting LNG to Asia Pacific after 2016 (Vukmanovic 2014) as new terminals will be launched (Leidos 2014). Thus, the U.S. will create competition to Middle Eastern and other producers.

Natural gas trade is expanding from a regional to global market. Historically, the complexity of natural gas processing and transportation (onshore pipelines, processing) has limited long-distance trade flows and diversity of trade flows (BP 2015). Expensive and unique gas transportation projects require substantial investment and, thus, long-term contracting (World Bank 2011), leading to mono- or oligopolistic markets and significant variations of gas prices across global markets (Figure 12).

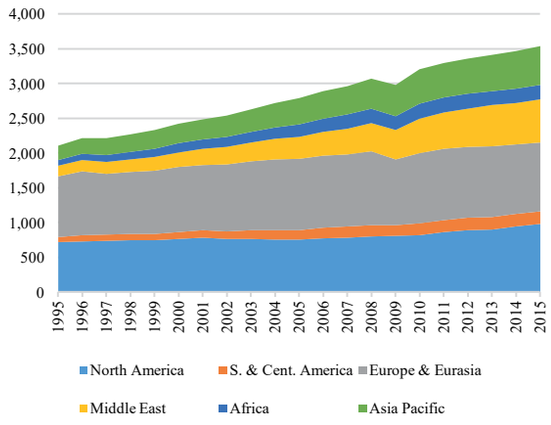
[3] Maritime crude, and recently LNG, being the cheapest mode.

Figure 9. Natural Gas Proven Reserves, trillion cubic meters



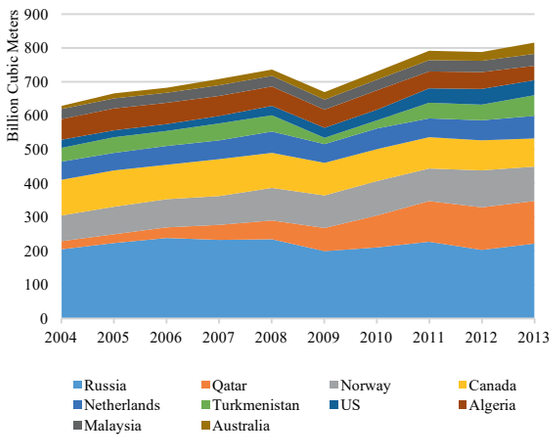
Source: Energy Information Administration

Figure 10. Natural Gas Production, billion cubic meters



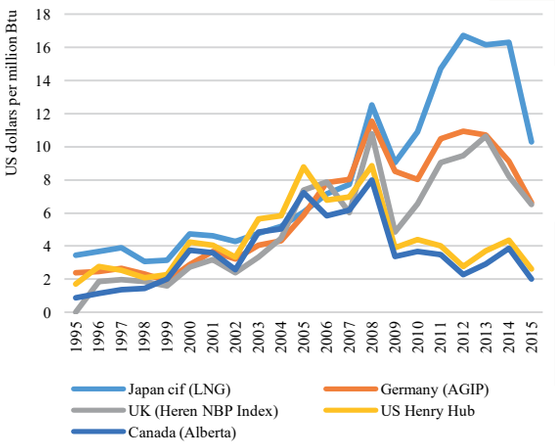
Source: Energy Information Administration

Figure 11. Top 10 Natural Gas exporters [4]



Source: Energy Information Administration

Figure 12. Natural Gas Prices in Various Regions



Source: BP Statistical Review 2016

LNG has facilitated entry of new buyers. As Asian markets shift from fuel oil to natural gas, demand for LNG is increasing at an estimated 4 to 6 percent per annum (Deutsche Bank 2013). France and the U.K. accounted for more than half of all gas imports, but current trends suggest that geographical distribution is becoming more balanced as OECD countries decrease their hydrocarbon dependency, while countries in Asia invest in the LNG infrastructure.

[4] Gas supply from Russia is not stable. In 2009, it dropped by 15 percent because of the Russian-Ukrainian gas dispute in January 2009 (80 percent of European gas supplies transit Ukraine) and the sharp decline in European gas demand stemming from the economic crisis, which resulted in a price reduction on European gas market.

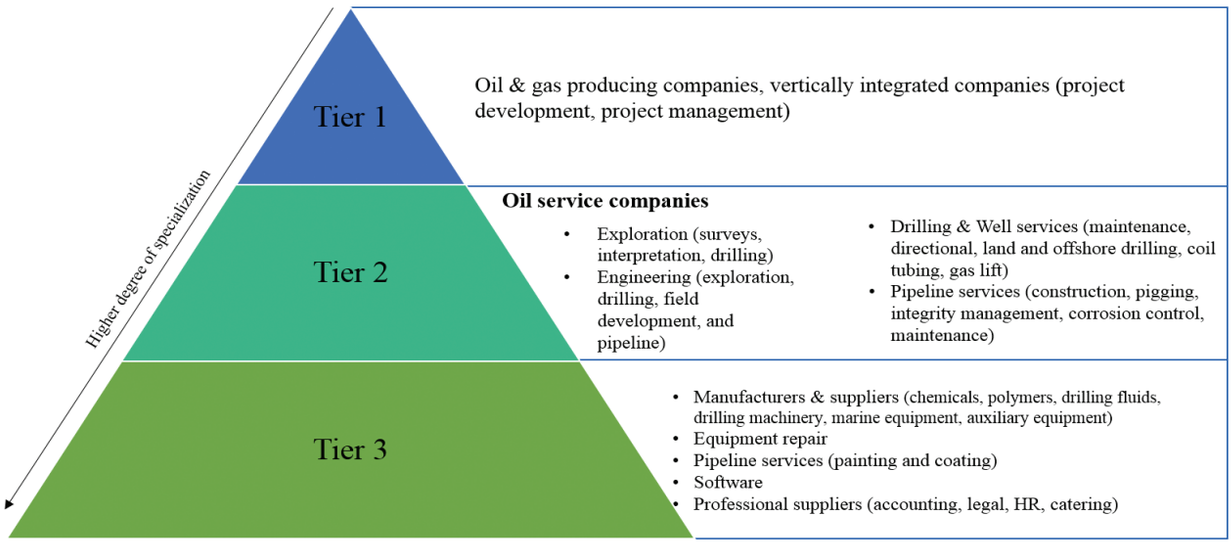
3.4. Lead Firms and Governance Structure

The oil and gas value industry is highly consolidated. The industry features relatively accessible technology, but its capital intensity favors the establishment of integrated companies with access to technology and financial and human resources. Integration allows companies to reach economies of scale (horizontal integration), economies of scope (vertical integration) and lower their costs (World Bank 2011).

Primarily, there are three tiers of companies in the oil industry. Vertically integrated international and national oil companies (IOCs and NOCs) are Tier 1 (Figure 14). They operate in all segments of the value chain and manage them, given that supply of crude is the source of power in the chain. Among the world's top players, there are privately owned and state-owned legal entities. Royal Dutch Shell and ExxonMobil are private IOCs, while Saudi Aramco is a state-owned NOC (Luis F. Ayala H. 2009).[5] The world's 10 largest oil and gas companies are integrated horizontally (operate globally) and vertically (operate in all segments of oil and gas value chain).

The second and third levels are represented by oil service companies (OSCs) and their suppliers (materials, equipment, services). These firms provide services directly to the Tier 1 companies and serve as suppliers to all segments of the chain.

Figure 13. Organization of Production System in the Oil and Gas Industry



Source: NAC

OSCs emerged when major players started outsourcing noncore activities for efficiency gains. In 2014, the size of the global oil-field service market surpassed US $400 billion (Doshi, Corrigan et al. (2015)). The biggest players in oil services are *Halliburton, Schlumberger, Baker Hughes, Transocean, Weatherford, Archer.* Box 2 describes the emergence and the role of the oil-field service industry.

[5] Most of the NOCs, which were established in developing countries in the 1970's, and started to compete with MNCs in transportation and processing, are still less efficient in terms of costs, investments and corporate strategies, and lag behind in the level of technological sophistication.

Box 2. Emergence of oil-field service industry

Up to the 1960s, producing companies executed all operations at the oil field and conducted R&D in-house. In the 1970s and 1980s, drilling and maintenance works increasingly became outsourced as specialized companies were more efficient in these temporary and relatively low-value activities. The outsourcing trend has gained more popularity, allowing oil and gas companies to focus on field development, project management, data interpretation, risk management, etc.

Prior to the oil shock of 1990s, oil-field services were relatively simple and low-value. However, price decreases forced oil companies to seek cost reduction and innovative solutions, which were consequently offered by the service industry. Taking from that, producing companies decreased their spending on research, while oil service started increasing its R&D investments and developed breakthrough technologies, including 3-D seismic surveys and horizontal drilling.

The industry trends suggest that, in the future, oil and gas production will become more complex, driving oil companies to concentrate their efforts on project and supply chain management, and outsourcing more of fieldwork. The role of oil-field service companies in production, thereby, will grow, and they deserve their nickname of "unsung horses" of the oil industry, as suggested by The Economist (KPMG 2016).

Table 2 illustrates the global leaders in each Tier. Large IOCs and NOCs in **Tier 1** are typically engaged in the development of a project and its management, and have a large network of suppliers of goods and services. In **Tier 2**, there are more specialized service companies engaged in specific types of works and services (Schlumberger, Halliburton). **Tier 3** includes even more specialized suppliers of goods, including manufacturers of equipment, tools and chemicals, and service providers (GE Industrial Solutions, SINOPEC Engineering).

Table 2. Lead firms, 2015

	Company	Main activity	Revenue 2015 ($M)	Number of employees	HQ location
TIER 1	Sinopec Corp	Integrated oil and gas	451 488	897 488	Beijing
	Royal Dutch Shell Plc	Integrated oil and gas	421 105	94 000	The Hague, Netherlands
	Saudi Aramco	Integrated oil and gas	378 000*	61 907	Dhahran, Saudi Arabia
	PetroChina Co Ltd	Integrated oil and gas	370 547	1 636 532 (CNPC)	Beijing
	ExxonMobil Corp.	Integrated oil and gas	364 763	83 700	Irving, Texas (U.S.)
TIER 2	Schlumberger	Oil-field service	35 475	95 000	Houston, Texas (U.S.)
	Halliburton	Oil-field service	23 633	65 000	Houston, Texas
	Fluor	EPC	18 100	60 000	Irving, Texas
	Saipem	Oil-field service	12 765	40 648	San Donato, Italy
	Baker Hughes	Oil-field service	15 742	36 000	Houston, Texas
TIER 3	GE Industrial Solutions	Electrical equipment	108,5	13 500	Fairfield, Conn (U.S.)
	Marubeni – Komatsu Ltd.	Mining, construction and civil engineering equipment	219,8	--	Tokyo
	Discovery Drilling Equipment Ltd	Equipment	--	700	Houston, Texas
	BASF Global Oilfield Solutions	Chemical products	--	--	Houston, Texas
	SINOPEC Engineering	Engineering services	16 048	19 360	Beijing

Source: Financial Times, Bloomberg, corporate reports, NAC

The refining industry is less consolidated than the exploration and production segment. The rising role of state-owned companies and the shift of the economic gravity have moved refining closer to its customers. State refineries, often owned by NOCs and IOCs, as well as large chemical manufacturers and small independent refiners, are typical players in the segment. For instance, in Kazakhstan, large refineries belong to the state holding company "Samruk-Kazyna"; the Indian government owns shares of the country's largest refineries—Indian Oil, Hindustan Petroleum (Bloomberg 2016).

The final sale segment is the least concentrated segment of the chain, as it does not involve complicated technologies. The source of power in this segment is flexibility of supply and trading. Customers consider fuels as a commodity; there is not much differentiation among them, allowing for diversity and competition among sellers. However, the high level of competition and insignificant variance among suppliers are typical only for fuel sales.

Despite consolidation of market power in the hands of integrated major companies, privatization and liberalization have become long-term trends in the industry.

3.5. Institutions and Standards

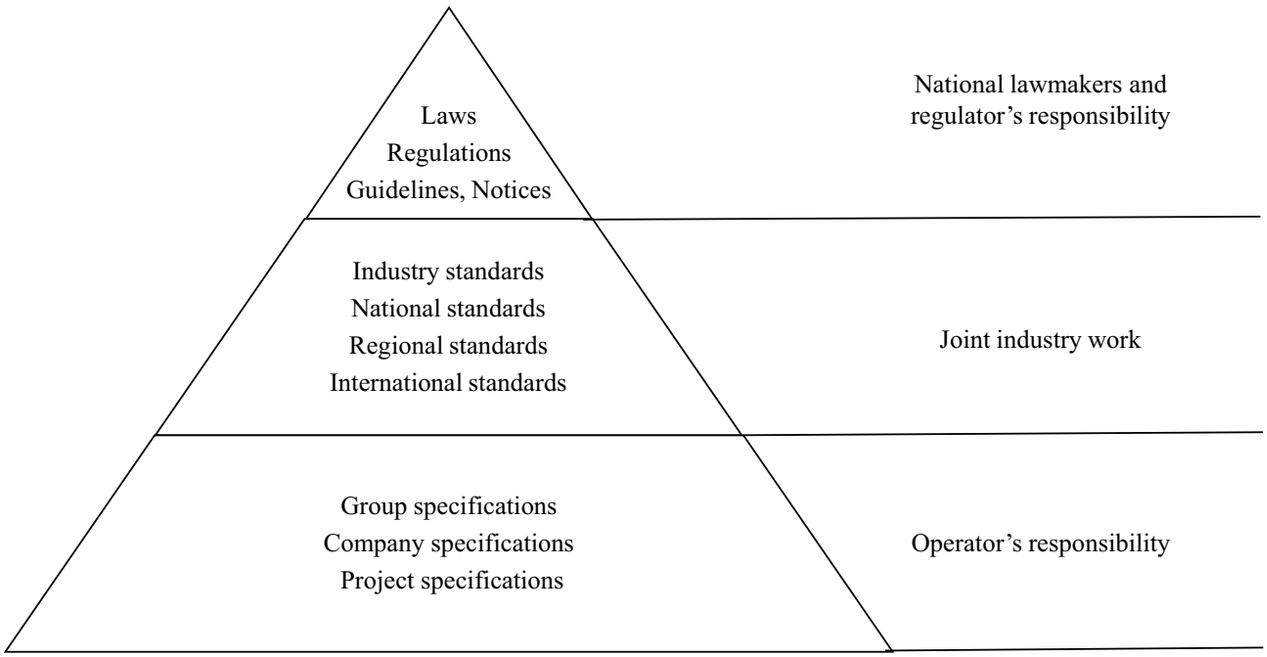
The industry uses several thousand standards. Given high risks and complexity of the business, public and private actors develop and maintain strict health, safety and environmental (HSE) standards and regulations based on the knowledge from exploitations of oil fields around the world. Standards of individual companies—operators that are used repeatedly to cater to the company's projects—often serve as a source of industry wide standards and regulations. As a rule, IOCs often maintain the strictest operational and HSE protocols due to the history of working in various conditions internationally, as well as to public pressure. National regulators widely use standards developed by the industry (OGP 2010).

International and national standardization bodies and industry organizations serve as sources of standards too. Specific needs of the industry—harsh environments, and hazards for human and environmental well-being—have determined the need for specialized equipment and materials. For instance, American Petroleum Institute has produced most of equipment and materials standards, as well as standards for related processes/operations that are recognized internationally and used in conditions similar to those in North America. The industry also makes use of standards that are nonspecific to oil and gas, but are accepted by professional associations such as American Society of Mechanical Engineers or National Association of Corrosion Engineers (Producers March 2010).

The host country's laws define the general operating framework for oil and gas companies. Governments try to maximize its benefits from the industry and often use standards and regulations not only to maintain environmental and labor security, but also to promote interests of local firms, and increase budget revenues (fines, payments, accreditation).

The hierarchy of the typical regulatory framework applicable to all segments of the value chain is shown in Figure 15 below (OGP 2010). Differences in the national regulation, companies' regulation, and the need to comply with the growing number of standards and regulations obviously increase the complexity of operational environment for the firms.

Figure 14. Hierarchy of Regulatory Documents



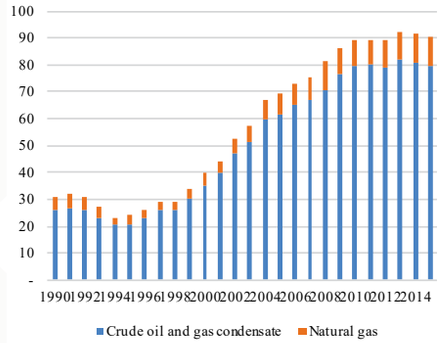
Source: (OGP 2010)

4. Kazakhstan in the Oil and Gas Value Chain

4.1. Oil and Gas Industry of Kazakhstan

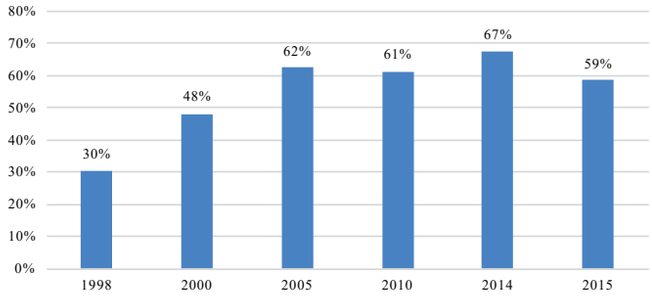
Kazakhstan is the 16th largest oil producer in the world and the second largest producer in Eurasia after Russia. In terms of oil reserves, the country takes 12th place, just behind Nigeria, with proved oil reserves of 30 billion barrels as of December 2015 (BP 2016). The country enjoyed rapid economic growth in 2000s due to the quick rise of oil output (Figure 16) and favorable price environment. Oil is the most important export item. Its share in the country's total export grew from 49 percent in 2000 to 59 percent in 2015, reaching almost 70 percent of exports at the peak price in 2014 (Figure 17). The country exports refined oil, however mostly middle distillates and fuel oil. Main oil products produced and traded by Kazakhstan internationally are gasoline, diesel and fuel oil. Over the last 10 years, there has been a growth in exports of fuel oil, a low value added product. In the segments of higher value light petroleum products (motor and aviation gasoline chart in Figure 17), the country is a net importer. Kazakhstan's gas reserves are relatively small—0.9 billion cubic meters, or 0.5 percent of the world total reserves (BP 2016).

Figure 15. Oil and Gas Production, thous. tons



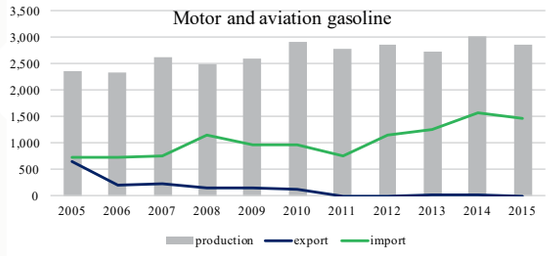
Source: Ministry of National Economy, Committee on Statistics (KZ)

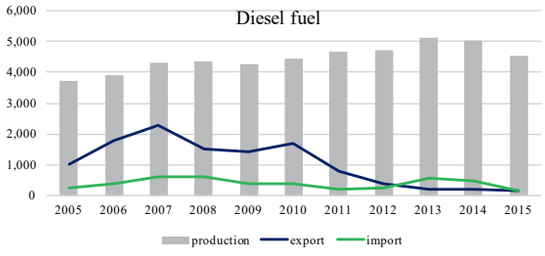
Figure 16. Share of Crude in Kazakhstan's Total Export

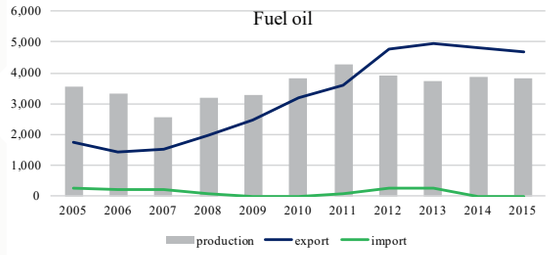


Source: UN Comtrade

Figure 17. Production of Refined Products, thous. tons







Source: Ministry of National Economy, Committee on Statistics (KZ)

Kazakhstan became a large oil producer in the 1970s. Many of the current oil fields were discovered and developed at that time. Construction of the major pipeline connected Kazakhstan's oil fields with refineries in Russia and opened the market for Kazakh oil.

The first foreign company to negotiate hydrocarbon production in Kazakhstan was Chevron. The negotiations on the development of the Tengiz field started in 1989, when Kazakhstan was still a part of the Soviet Union. After the dissolution of USSR in 1991, Kazakhstan did not have resources or capacity to develop its subsoil reserves. The government signed exploration contracts with IOCs 6 and after reserves in North Caspian were confirmed, signed production agreements. In 1993, Kazakhstan and Chevron signed "the contract of the century" and established joint venture "Tengizchevroil" to extract hydrocarbons at the giant field (Tengizchevroil 2016). The same year, the government of Kazakhstan and IOCs such as Agip, BP, Statoil, BG, Mobil, Total and Shell signed agreements on exploration in the Caspian shelf. During the first years of independence, the country offered lenient conditions to foreign oil companies signing production sharing agreements (PSAs). These types of agreements particularly suits countries with developing or transitional economies that do not possess financial or technical resources for independent field development (IIED 2012). After abolishment of the PSA regime in 2011,7 subsoil users have to acquire license to conduct exploration and production activities.

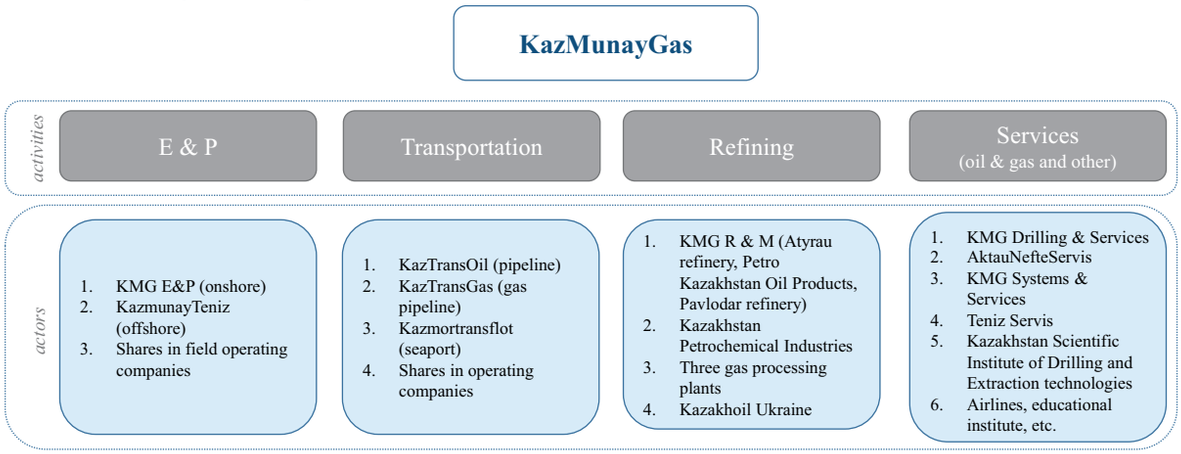
[6] Today, companies compete for exploration rights on designated plots through tenders.
[7] Three largest PSAs—Kashagan, Karachaganak, and Tengiz—remained intact.

National company "KazMunaiGas" JSC (KMG) was established in 2002 after a merger between national producing and transportation companies "Kazakhoil" and "Transportation of oil and gas." Ninety percent of KMG shares belong to Sovereign Wealth Fund "Samruk-Kazyna", and 10 percent belong to the National Bank of RK. KMG group consists of 220 companies.

KMG is a vertically integrated oil and gas company present in all segments of the petroleum value chain. KMG and its subsidiaries account for 28 percent of petroleum liquids production, and 16 percent of natural and associated gas production. The group provides 65 percent of transportation pipeline services, 77 percent of sea transportation from Aktau port and 95 percent of gas pipeline transportation within Kazakhstan. It takes a lead position in refining, with 82 percent of total oil processing, and accounts for 17 percent of refined products market.

KMG's publicly listed arm, "KMG Exploration & Production" (KMG E&P), is the main production unit; however, KMG also owns shares in the field operating companies; a number of service, transportation and consulting companies; and major refining plants (Figure 18).

Figure 18. KazMunayGas Group



Source: NAC, KMG Annual Report 2014

KMG possesses substantial resource base—over 1 billion tons. Nonetheless, most of the company's operating oil fields are mature, past their production peak. Production at these fields is profitable at Brent price US $40 per barrel or higher. The recent decline in oil price and accumulated debt due to acquisitions of stakes in the major projects squeezed KMG's profit margins, pushing it to cut costs and even sell 10 percent of the shares to Kazakhstan's central bank. The move is a disguised US $4 billion loan.

KMG represents the government in Kazakhstan's largest oil projects of (see Ошибка! Источник ссылки не найден.3) and serves its social aims too. Social obligations explicitly or implicitly placed on the company by the government add to KMG's burden. The company operates in Western Kazakhstan's areas, where the oil and gas sector may be the only employer. Since 2011, the decline in oil recovery and prices led to strikes, creating tensions in the region. KMG is now forced to maintain its unprofitable subsidiaries, financing (or subsidizing) service companies, which employ around 9,000 people in total, for social reasons. These companies specialize in temporary activities, which are uncompetitive and kept afloat to provide jobs in the oil-producing regions of the country.

Table 3. Oil and Gas Producers in Kazakhstan

Oil Field / Develop	Shareholders	Start year	Production	Export
Production				
Tengiz/ Tengizchevroil	Chevron (U.S.) – 50% ExxonMobil (U.S.) – 25% KMG (KZ) – 20% Lucarco (RU) – 5%	Signed in 1993 for 40 years	27.158 million tons of hydrocarbons in 2015	--
Kashagan/ North Caspian Operating Company	Eni (IT) – 16.81% Royal Dutch Shell (NL/U.K.) – 16.81% ExxonMobil (U.S.) – 16.81% Total (FR) – 16.81% KMG (KZ) – 16.81% ConocoPhillips (U.S.) – 8.4% Inpex (JP) – 7.55%	Signed in 1997	Production commenced in October 2016	--
Karachaganak/ **Karachaganak Petroleum Operating B.V.**	BG (U.K.) – 29.25% Eni (IT) – 29.25% Chevron (U.S.) – 18% Lukoil (RU) – 13.5% KMG (KZ) – 10%	Signed in 1997	Production: 11.7 million tons (49 percent of gas production, 18 percent in KZ)	141.7 million barrels of oil equivalent
	KMG Exploration & Production JSC (KZ). KMG – major shareholder	Established in 2004	12.351 million tons of oil (2015)	8.305 million tons (2015)
	CNPC-Aktobemunaigas JSC (CN/KZ)	1981	5.9 million tons (2014)	
Transportation				
Caspian Pipeline Consortium	Russian Federation – 24% KMG (KZ) – 19% Chevron Caspian Pipeline Consortium – 15% Lucarco (RU) – 12.5% Mobil Caspian Pipeline Consortium – 7.5% Rosneft-Shell Caspian Ventures Ltd. (RU/ U.S.) – 7.5% CTC Company – 7% BG Overseas (U.K.) – 2% Eni (IT) – 2%	Signed in 1992. Operated since 2001	Connects Atyrau (KZ) with Novorossiisk sea terminal (RU)	35.2 million tons of oil from Kazakhstan (2014)
	Kazakhstan Pipeline Ventures – 1.75% Orix Caspian Pipeline Ltd. – 1.75%			
Atyrau-Samara pipeline	KazTransOil JSC (KZ)			14.6 million tons (2014)
Kazakhstan-China pipeline	KMG (KZ) CNPC (CN)	Signed in 2004		11.7 million tons (2014)
Aktau seaport	KazMortransflot JSC (KMG – 100%)			4.7 million tons

Oil Field / Develop	Shareholders	Start year	Production	Export
Refining				
Atyrau oil refinery	KMG Refining & Marketing (KZ) – 99.53%	1945	4.9 million tons	0.95 million tons of heavy distillates
Pavlodar Petrochemical Plant	KMG Refining & Marketing (KZ) – 100%		4.9 million tons	
PetroKazakhstan Oil Products	KMG (KZ) – 50% CNPC (CN) – 50%	1985	5 million tons	

Source: www.tengizchevroil.com/about/overview, KMG R&M Annual Report 2014, http://bnews.kz/

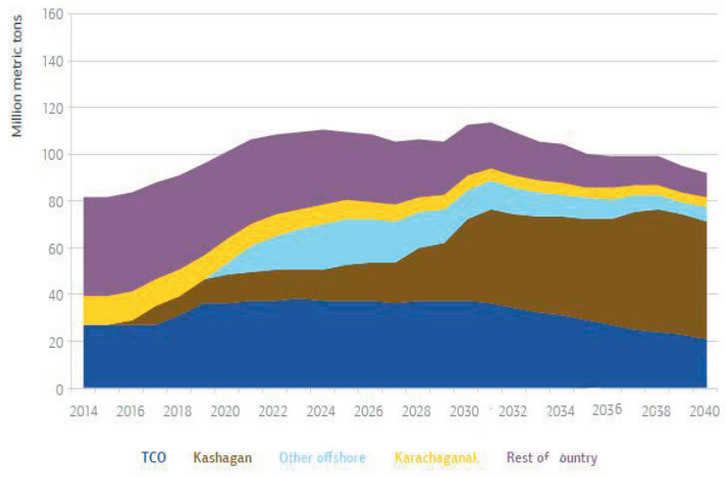
Business climate for oil and gas companies has been changing significantly. The history of policy toward extractive industries can be divided into the following periods:

1. **In 1991-2004, the goal was to attract foreign investors by offering favorable investment conditions**. At the early stages of industry development, PSAs allowed the government to take advantage of investors' expertise and technology. According to PSA terms, investors' expenses are reimbursed with hydrocarbons produced and at a later stage, after initial expenses have been covered, producers start paying taxes. Since that moment, the government's share in production gradually increases.
2. **In 2004-08, Kazakh government was establishing its positions in the sector.** Legislation changes in early 2000s aimed to increase taxation of extractive industries to benefit the rest of the economy. General taxes, such as corporate income tax and VAT, were reduced from 30 and 20 percent to 20 and 12 percent, respectively, while new taxes on extractive industry were introduced. PSAs were abolished, and the stability clause was removed from the tax code. The government increased its shares in large projects through buyouts of shares from foreign companies, e.g. KMG purchased half of BG's share or 8.33 percent in the North Caspian project in 2005 and dissolved smaller PSAs in 2010.
3. **The period from 2009 to present time covers aftermath of the crisis characterized by wide fluctuations in the price of oil**, and policy initiatives were aiming to maximize government profit. After hitting a record US $143 per barrel and falling sharply in 2008, Brent price rose to US $126 per barrel in 2009 and plummeted to around US $30 in 2016. During this period, the Kazakhstani government increased, decreased or abolished export duties for many times to sustain high income from customs duties and to react to investors' concerns of increased burden, when prices were low.

Overall, there is inconsistency in the policy toward extractive industries; regulation and taxation change frequently. Firms also express dissatisfaction with the quality of tax administration. Surveys show that firms in Kazakhstan get more visits from tax and other authorities than in other countries of Central Asia and Eastern Europe (OECD 2012).

Maximizing returns from reserves is linked to the stabilization of production levels. Production is expected to grow significantly only at the offshore giant Kashagan field. There are also a number of smaller fields discovered in the 2000s, which have not struck oil yet. However, the rest of the oil fields are in decline, and the cost of oil production in Kazakhstan is relatively high. For instance, development of Kashagan oilfield, which is expected to be the main source of Kazakhstan's production growth, is already the world's most expensive project, and its launch was postponed for two years, from 2014 to 2016, building up the investors' costs and contributing to stagnant oil production. At the current level of technology, oil production in Kazakhstan is projected to sustain its levels or rise insignificantly (Figure 19).

Figure 19. Oil Production Forecast by the Largest Players, million tons



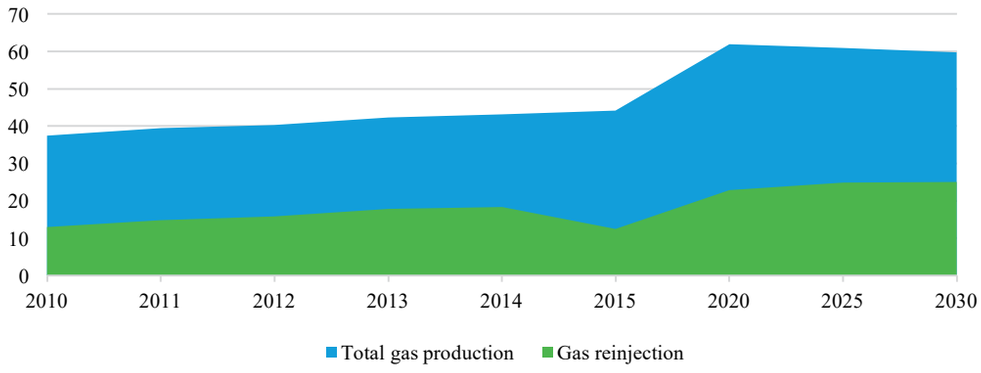
Source: KAZENERGY National Energy Review 2015

For a vast landlocked country, transportation is a significant challenge. The main transportation mode for Kazakhstan's oil is pipelines. The country is far from major trade routes and depends on Russia to transit its oil to the world markets.

State-owned company KazTransOil JSC, subsidiary of KMG, is the largest pipeline service provider. Major export routes are Caspian pipeline consortium (CPC), which transported 38 million tons in 2015; Atyrau-Samara pipeline to Russia, 15.7 million tons during the same period; Atasu-Alashankou pipeline from Western Kazakhstan to Western China, 11.8 million tons; and Aktau seaport, 7 million tons. The rest of oil production (1.5 million tons) was transported by railway; some condensate (0.3 million tons) was exported via pipeline to Orenburg refinery.

Kazakhstan's gas value chain is relatively short. Major gas reserves are in Karachaganak field (46 percent), Tengiz (12 percent) and Imashevskoe (7 percent). There are only a few pure dry natural gas fields in Kazakhstan; most of the gas comes as condensate associated with petroleum liquids from oil wells, and about one-fourth of it is injected back into the well to sustain the pressure.

Figure 20. Forecast of Gas Production and Re-Injection, 2014-30, million cubic meters



Source: KAZENERGY National Energy Review 2015

Gas fields are located in the western part of Kazakhstan, and given the country's vast territory and harsh climate, its delivery to other regions requires significant investments. According to energy producers' association KAZENERGY forecast (Figure 20), the republic will face gas deficit in the midterm as demand outpaces supply, which is limited by oil production needs—almost 40 percent of gas is re-injected back to sustain pressure. Therefore, current research will focus on oil value chain only.

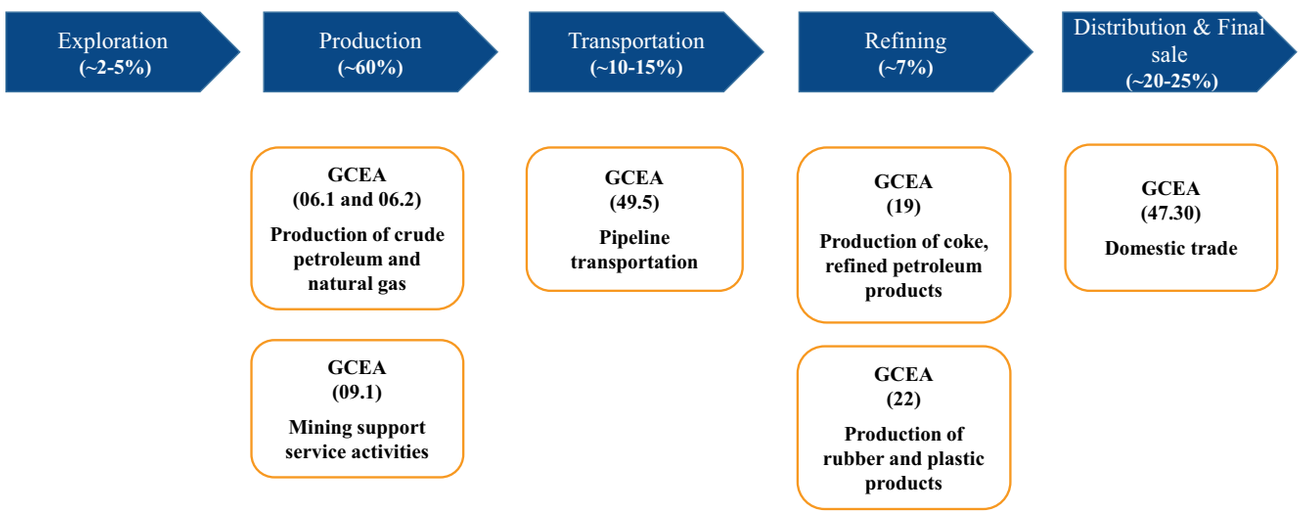
Although Kazakhstan refines oil and potentially participates in the refining segment of the GVC, the country does not export refined products.[9] Three major refineries that belong to KMG and a few independent mini-refinery plants represent the segment in Kazakhstan. Crude is supplied to domestic refineries at a discount price as part of production agreements with foreign companies. As of 2015, production contracts guaranteed the annual supply of 3 million tons for domestic market, although market demand was around 15 million tons.

A regulated market of refined petroleum products often creates a shortage of fuels, especially during high seasonal demand periods. Therefore, the government banned exports of distillates and arranged swap agreements with Chinese and Russian refineries, exchanging crude for refined products.

4.2. Kazakhstan's Position in Oil and Gas Value Chain

The analysis of oil and gas value chain development builds on analysis of evolution of the types of economic activities within each segment of the chain. Types of economic activities have been identified according to the General classification of types of economic activities (hereinafter – GCEA) (Figure 21).

Figure 21. Oil and Gas GVC

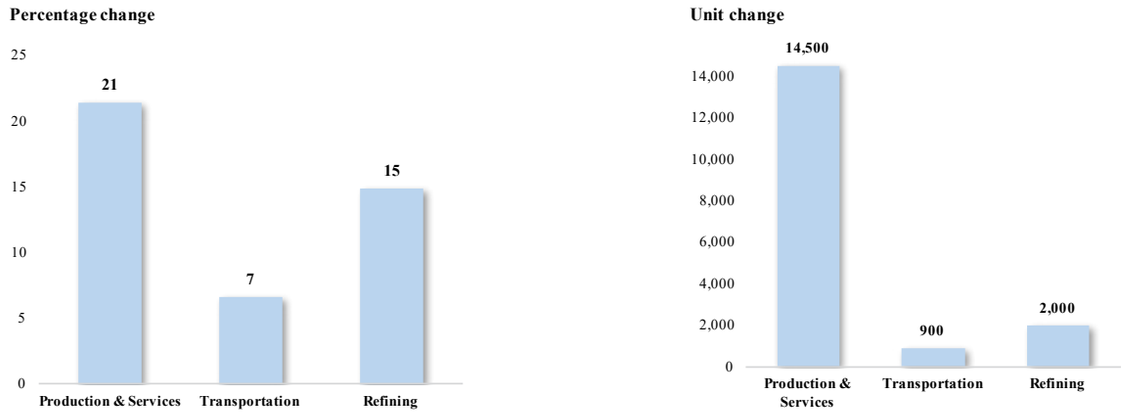


Source: Ministry of National Economy, Committee on Statistics (KZ)

During 2010-15, the largest growth—in terms of number employees and level of wages—occurred in the production segment and related technical services. Particularly, during these last five years, number of employees grew by 21 percent, or 14,500 people (Figure 22), while average monthly wage increased by 119 percent, or 370,000 tenge (Figure 23).

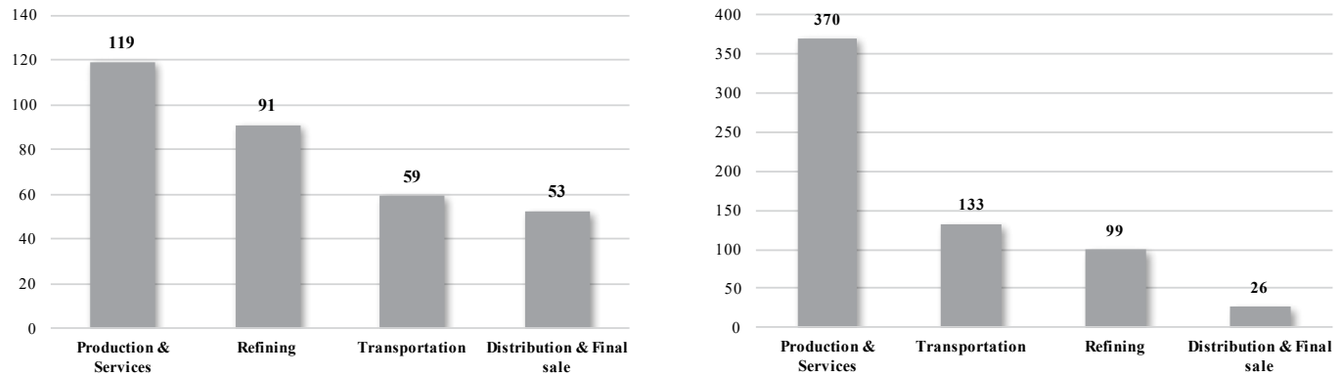
[9] KMG International, an arm of KMG, owns majority shares in Rompetrol and Petromidia refining plants and distribution brands in Europe, based in Romania. However, there is no export of refined products from Kazakhstan, except for low value fuel oil.

Figure 22. Change in the number of employees by sectors, 2010-2015



Source: Ministry of National Economy, Committee on Statistics (KZ)

Figure 23. Change of Average Wage in 2010-15



Source: Ministry of National Economy, Committee on Statistics (KZ)

As mentioned earlier, the largest share of value added is created at the production stage. In Kazakhstan, particularly, production of oil and gas and mining-related services [10] account for 60 percent of value added in Kazakhstan's oil and gas sector (Ministry of National Economy, Committee on Statistics (KZ) 2015).

Low share of value added in the Refining segment—only 7 percent of the sector's GVA in 2015—looks counterintuitive; however, it can be explained by the ongoing modernization program, and the fundamental reason may be the low depth of refining. Domestic production of oil products meets around 78 percent of the country's demand. Since 2008-09, Kazakhstani refineries are undergoing massive modernization to increase refinery depth from current 63 to 74 percent, to 90 percent, and upon completion in 2017, they are expected to fully cover domestic demand for oil-based products until 2020. Taking into account that the largest exporters of oil-based products in the region—Russia, China, Iran, Azerbaijan—increase and upgrade their refining capacities in order to export to Central Asian countries and Mongolia (Petromarket Research Group 2016), we believe that Kazakhstan's refining industry should aim to meet domestic demand without investing in export capacity.

In our view, a potential pathway to add value in Kazakhstan's oil and gas industry lies in oil-field services, the most technologically advanced and mobile sector related to oil and gas.

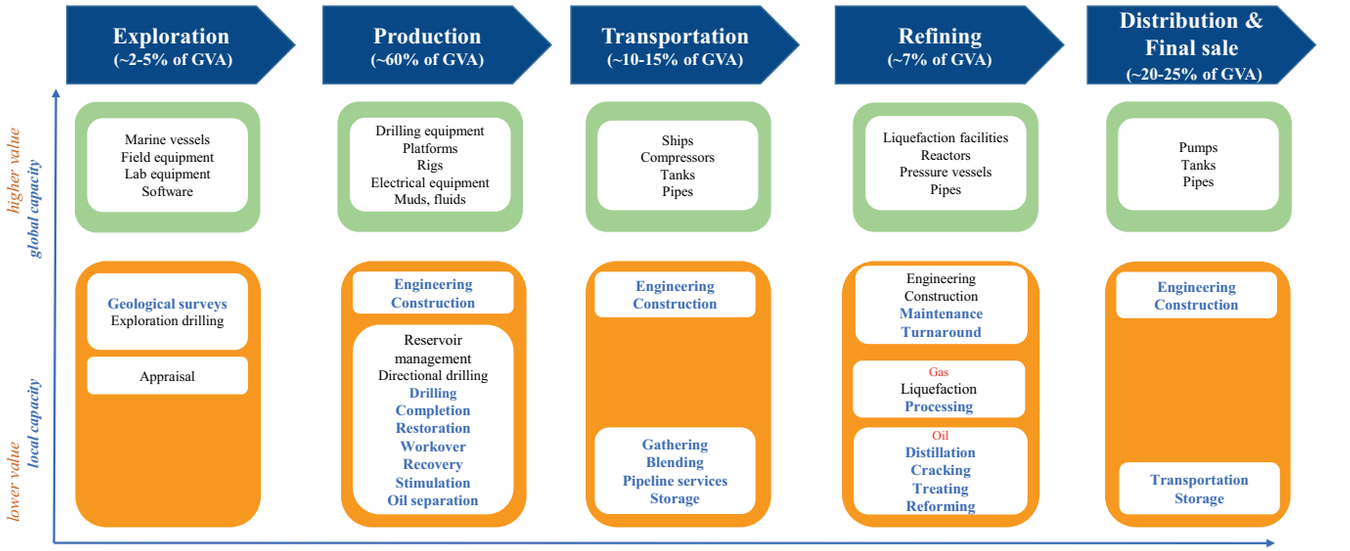
[10] Considering that Kazakh oil and gas companies prevail in mining sector, we assume that oil-field service companies comprise majority of enterprises in the activity "Mining support service activities."

5. Oil-Field Service Industry in Kazakhstan

5.1. Assessment of Kazakhstan's Capacity in the Oil-Field Industry

According to the analysis and interviews conducted by NAC, Kazakhstani companies are present in each segment of the value chain. Figure 24 illustrates the niche of Kazakhstani producers (services provided by local firms are highlighted in blue) against the rising value scale on the left. The scale and positioning are approximate; assessment is prepared by NAC staff over the course of interviews. The striking feature is the import dependence of the oil and gas industry in terms of equipment, which comprises the largest share of capital expenses.

Figure 24. Local Companies' Capacity

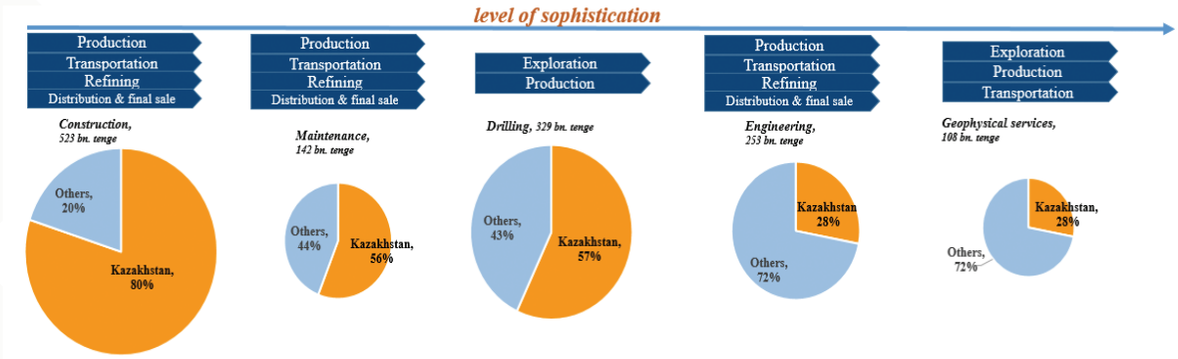


Source: NAC

Currently, more than one thousand companies with approximately 170,000 people work in Kazakhstan's oil services market. Oil services can be roughly divided into five main segments: drilling; construction; design and engineering; maintenance and expertise; and geophysical services. Typically, the drilling segment was the largest; however, in 2015, the volume of construction was larger than drilling due to a pipe replacement project at the Kashagan oil field and the future expansion of Tengiz field (KazService 2016).

Kazakhstani companies are widely represented in less technologically advanced segments, particularly, in construction, maintenance and (vertical) drilling operations. Generally, the more complex the activity, the higher the share of foreign companies in the market. For instance, the share of Kazakhstani companies in the market of geological and geophysical services is only 28 percent (Figure 25). Although they have potential to do so, local companies are not sufficiently represented in the domestic market. Leading Kazakhstani service companies have demonstrated their international competitiveness by successfully operating in regional markets of Russia, Turkmenistan, China and India.

Figure 25. The Footprint of Local Companies



Source: KazService Association

5.2. Upgrading Opportunities

There are many potential pathways to economic upgrading, which in the GVC framework means that firms, countries or regions move to higher value activities in order to increase the benefits (profits, security, capabilities) from participating in global production (GVC Primer 2016).

Comparing the upgrading trajectories of various oil-producing countries is crucial for identifying strategies that Kazakhstan can employ to advance along the oil and gas value chain. Table 4 provides some examples of upgrading strategies in the oil and gas industry.

Table 4. Upgrading Trajectories in the Oil and Gas GVC

Upgrading Paths	Description
Entry into the VC	Hydrocarbon-rich countries typically enter the chain with the start of oil and gas extraction. To enter the chain, the country does not need highly developed technologies or skills. It can provide the right to operate field to IOCs or participate in production through its agent, NOC, retaining some control over activity. **Example.** Middle Eastern OPEC countries entered the chain when IOCs started extracting oil in the region. In 1960s, upon gaining independence, these countries established NOCs and started upgrading within the chain.
Process Upgrading	Process upgrading is required to increase efficiency of production, which, for instance, in the upstream segment, maximizes extraction rates. It should be noted that, in commodity value chains, process upgrading is the most common type of modernization. **Example.** Within the production stage of the oil and gas value chain, maintenance activities help sustain high volumes of production. They involve water or gas lift, water flood, injections of carbon dioxide, steam, miscible solvents or surfactants into reservoirs. Hydraulic fracturing, for instance, is one of maintenance activities. Evolution of fracking allowed to significantly reduce the cost of shale oil and gas production in the U.S.
Product Upgrading	Product upgrading can take place within downstream segments of the chain, when a firm diversifies from basic gasoline and diesel fuel to more complex products, e.g. petrochemicals. **Example.** The Netherlands started participating in the chain with the discovery of large gas reserves, and then used the country's favorable geographic location to establish a refining industry at its sea ports. Today, the country imports oil and gas from Russia, Norway and the Middle East (mainly LNG from Qatar); produces oil products; re-gasifies wLNG; and then exports a wide range of oil products, as well as gas and LNG to European markets.

Upgrading Paths	Description
Functional Upgrading	Functional upgrading in the oil and gas industry usually means moving from extraction and selling of crude oil and gas to midstream and downstream activities—storage and transportation, refining, marketing and distribution. **Example.** After entering the industry, Norway used local content policies to stimulate IOCs to establish R&D centers and the development of a sophisticated service industry. Vertical integration is another example of functional upgrading by developing backward and forward linkages. The oil and gas industry is risky because of its capital intensity, price volatility and probability of finding commercial reserves. Therefore, vertical integration of production segments within one company allows the realization of economies of scope and mitigating risks that emerge along the production chain.
Chain Upgrading	Chain upgrading means using the experience from operating in oil and gas sector GVC to another industry. A supplier, through backward linkages, could diversify its activity from servicing oil and gas companies to servicing other mining industries. **Examples.** Suppliers in Chile moved from providing services to the copper industry to supporting the needs of the manufacturing industries.
Geographic End Market Upgrading	Geographic end-market upgrading means entering new markets, or diversifying export routes. **Example.** Due to gas liquifaction technology, Qatar started supplying LNG to Europe's higher-value end market through Rotterdam. This is an example of both process and geographic market upgrading.

Source: NAC

One of the obvious pathways of upgrading would be to boost refining in Kazakhstan. Yet, the key feature of upgrading within GVC is the realization of export potential. Upgrading in the refining segment is already underway within the framework of the refining modernization program. After completion of the program, the three refineries' production will cover domestic demand and Kazakhstan may become net exporter in 2018. Given the plans of neighboring oil producers—Russia, China, Azerbaijan and Iran—to increase their refining capacities and thus cover regional demand in Central Asia and Afghanistan, **Kazakhstan has limited chances to find export markets for its oil-based products** (Petromarket Research Group 2016).

5.3. Local Capability Development

There are a number of reasons behind Kazakhstani firms' position relative to foreign oil-field service companies.

First, oil companies typically operate within tightly coordinated networks of technologically sophisticated and financially powerful suppliers with a global reach. Therefore, they provide few opportunities for local participation, particularly in developing countries. Procurement processes of IOCs are often driven by these pre-existing networks and lack transparency. Historically, this has often limited the role of local firms to non-tradable and lower value operations. Over the past decade, procurement operations have become even more global, while modular development has resulted in previously nontraded services such as construction and fabrication being relocated to the most cost-efficient locations. This has further contributed to a decline in local participation. Today, new fields are developed by engineering firms based in key centers around the world, with little knowledge of local firms or their capabilities. Project requirements are defined by global standards,

rather than those of the production sites, and suppliers must be certified to even prequalify for bidding. However, many local firms are not even aware of these standards, immediately excluding them from procurement processes.

Second, local companies often lack the required capacity. Kazakhstan, among many other countries, pushed IOCs to source locally. The country has undertaken a quantitative approach to local content requirements, setting in 2014 percentage targets of goods, works and services purchased by oil and gas producers in the country. The law obligated oil and gas companies to source locally 72.5 percent of works (i.e. operational activities) and services (i.e. consulting) jointly, whereas percentage share of goods (e.g. equipment, etc.) had to be at least 16 percent. This legislation was subsequently complemented by voluntary agreements on local spending for projects operating under production sharing agreements, initially exempt from requirements.

Despite these measures, utilization of local content remains far below the target, reaching 54 percent in 2014. While this was up from 45 percent in 2010 (KAZENERGY, 2015), by unpacking these outcomes further, it becomes clear that a significant portion of this spending is generated through KMG, which reported 72 percent local content procurement in 2014 and sourced primarily from its own subsidiaries. Meanwhile, independent service firms highlight that they are struggling to remain competitive, while buyers say that they cannot find capable local firms to hire (Field Research, 2016).

Third, the operating environment for Kazakhstani companies is challenging. The challenges include, for instance, limited access to finance, exacerbated by exchange rate fluctuations. Having to import equipment and pay loans in local currency, Kazakh suppliers find themselves in a disadvantaged position compared to foreign competitors. Many local companies are excluded from the largest projects of international oil companies because they are unable to provide sufficient financial guarantees from local banks.

Fourth, the fundamental challenge of lack of qualified human capital with business as well as technical skills underlies the failure to meet safety, quality and technical standards requirements of international oil companies. For example, Kazakhstani companies with required technical capabilities are often barred at the prequalification stage due to lack of knowledge and/or attention to the adequate completion of applications in accordance with international oil companies' requirements. One production company we interviewed mentioned delays in project expansion because the company could not find enough workers with required technical specialization in the market (Field Research, 2016).

One hundred percent of interviewees highlighted the poor quality of the education system in Kazakhstan. Only a few schools and colleges deliver world-class outcomes in terms of the quality of graduates. For a number of reasons—including poor teaching standards, professor qualifications, inadequate curricula and lack of opportunities for industrial placement—a majority of education institutes fail to serve the needs of the industry, resulting in low job placement among Kazakhstani graduates. According to a study by the Ministry of Labor's Analytical Center the job placement rates for the 2,000 to 3,000 annual graduates of petroleum-related degree programs was just 7 percent in 2014, and new graduates accounted for just 3.1 percent of the workforce (Information Analytical Center, 2016).

There are few opportunities for ongoing training and education after graduation. Education

[11] There are currently three systems: contractors operating under PSA regime (own closed system), a group of KMG companies (Samruk-Kazyna procurement system) and private companies (operate within NADLoc's system).

of the workforce remains the purview of companies, and there are little incentives to invest in training for private actors. As a rule, large companies have training programs within their networks for professional qualification enhancement and within the Kazakh education system for basic skills training, such as English or safety training, or customized training. Smaller local companies have fewer resources to reach a comparable level of workforce development, thus exacerbating their competitive disadvantage.

Some political efforts attempt to strengthen local capacity to participate in the supply chain. These include the introduction of e-procurement process, and efforts by the government through industry associations (KazService, KAZENERGY and PSA LLP) and the country's largest operators (TCO, KPO) to promote joint ventures and provide insights into market demand. Kazakhstan introduced an e-procurement system in 2013 with a goal to reduce information asymmetry, thereby ensuring local firms are informed of potential opportunities and compete in tender process. However, the effort is undermined by the existence of separate rules and e-procurement systems for different groups of oil producers,[11] resulting in market fragmentation that adds up to administrative costs of potential bidders.

Besides, Kazakhstan's education system fails to address specific industry needs and increase its flexibility to react to demand changes. Unlike many other oil-producing countries, Kazakhstan lacks a coherent human development strategy. Local and foreign firms maintain that there is an acute shortage of qualified labor for key occupations; the quality of graduates is poor; and there are few opportunities or incentives for ongoing skills development.

6. Lessons From Other Countries

6.1. Human Capital

This section investigates best international practices of oil and gas exporters, which have successfully overcome the human capital development challenge by engaging all stakeholders instead of placing emphasis on the education system alone. In our view, one of the limitations to human capital development in Kazakhstan has been the lack of coordination and lack of responsiveness of the education system to the industry needs. Therefore, the optimal path forward is to create a workforce with industry-relevant skills through a participatory approach with industry, government and education.

There are several key features of a top performing workforce development system: A) a coherent workforce development strategy put together by all relevant stakeholders; B) a demand-driven approach in response to industry needs at both the technical and professional levels; C) high-quality teaching staff; D) curriculum adherence to evolving dynamics of the global industry; and E) an emphasis on practical experience for an optimal education.

Many oil-producing countries—the U.S., U.K., Australia—establish a specific industry strategy for the development of human capital in which all important stakeholders are involved. For example, in **Alaska**, the industry launched a five-year workforce development strategy for 2014-18. The plan was jointly developed by two committees, an industry steering committee with 11 representatives from the private sector, and a technical and education committee, comprised of representatives of the educational institutions at the university and TVET levels, labor unions, as well as key governmental departments: Labor, Education and the

Commerce, Community and Economic Development (Alaska Workforce Development Plan 2014). **Western Australia** prepares a similar workforce development strategy for its resources sector, including specific details on how the plan is to be implemented. The **U.K.** has also developed a workforce development strategy, mainly focused on talent retention and the identification of skills gaps, particularly at the TVET level (UK Government 2016).

These strategies include an analysis of industry trends and the country's industry development plans, detail job profiles, talent retention approaches, and an examination of the educational system's capacity to supply the right skills for both the short and long term. Due to information gaps, establishing an effective strategy requires the engagement of multiple stakeholders. Yet this can be challenging since formal communication channels between private sector and educational institutions (public and private) are often weak or nonexistent in many developing countries. Examples from developed countries show that educational institutions are generally more successful when they have a high degree of interaction with industry stakeholders. This interaction can take place between both formal and informal communication channels, with the government playing the role of facilitator to bring together the various actors.

Successful strategies are developed using a demand-driven approach; that is, developing human capital supply in response to the demands of industry for specific skills. Availability of qualified labor and agility of the workforce development become a competitive advantage. Participation in different stages of the oil and gas GVC requires different sets of skills; thus, it is critical to develop feedback mechanisms with industry to ensure the skills being taught at any one time are those appropriate for the current stage of the value chain, and not just the industry in general.

One widely used mechanism to ensure that demand for workforce meets adequate response is an industry-specific labor market survey. **The U.S. Department of Labor** carries out an annual Occupational Employment Survey, from which it derives highly detailed information on current and projected employment numbers for a large range of job profiles in the industry, earnings by occupations, typical entry-level education, experience and on-the-job training requirements, and occupational health and safety concerns. This data is available publicly and is also linked to an online resource O*NET, which provides even further information about daily tasks of each position (O*NET OnLine 2016). The **U.K.** provides a similar site (www.myoilandgascareer.com) to orient job seekers toward high-demand roles.

In **North Carolina (U.S.)** the community-college system uses this data-driven approach to ensure it is highly responsive to local business' requirements to shape its supply of training tools and education profiles according to the most up-to-date industrial needs (Little 2016). Another instrument for directing students toward high-demand positions is to provide scholarships only for high-demand careers, and not those where supply already outstrips demand.

This approach is also being used in the U.K. to drive entry into engineering degrees where there is an annual deficit of approximately 55,000 engineers. The U.K. provides scholarships of up to US $53,000 per student pursuing these degrees (LaunchpadRecruits 2016).

Quality of the teaching staff is considered to be a critical element by both industry and educational institutions. In an industry such as oil and gas, practical industry experience is fundamental for teachers to adequately prepare students to enter the workforce. This is important to ensure that the knowledge and skills of students is linked to the reality of the workplace, from applicable theories to the application of new technologies. In many instances, this is resolved by engaging the private sector to teach in the classroom, as well as providing opportunities for professors to work in the industry. For example, leading universities such as **Texas A&M (Texas, U.S.)** worked with oil and gas companies during the peak of the boom to allow experienced workers to take a "sabbatical" to teach for one to two years before returning to their jobs

(Holeywell 2014). At the TVET level, industry professionals teach in local community colleges; for instance, in North Carolina's community colleges, established practitioners teach classes at least two times a week. The reason why community-college education in North Carolina has been a success lies in the close cooperation of private sector, local authorities and management of the education institutions. For example, the Advisory Board of the community-college system consists of industry professionals, among other stakeholders (Little 2016).

Part of the challenge of retaining high-quality teaching staff is the cost for educational institutions, particularly during periods of high demand. Yet, when industry is engaged in a constructive dialogue, it can understand the longer-term benefits of maintaining teaching staff in place. For example, to help meet the needs of the sector in **Russia**, BP established a long-running program in which they sponsored professors for up to US $100,000 at leading Russian universities (ILO 2012). In the current downturn, other schools have been able to tap into the experienced staff members that are currently retiring from industry. This is not uncommon in **Kazakhstan**; staff at Caspian Social University (Almaty, Kazakhstan) noted that due to extreme work conditions in the fields, industry professionals retire early and move to more comfortable living locations, where they can utilize their expertise—in education, among other options (Field Research, 2016).

The curriculum changes to meet the evolving needs of the global industry. The extractive sector is characterized by rapidly evolving technologies and is dominated by international companies that maintain strict standards with respect to technical protocols, safety and environmental impact. In order to graduate job-ready workers, educational institutions must keep up with these requirements. Numerous developing countries have thus adopted international curricula to secure employment for local workers. For example, in the early 2010s, **Saudi Arabia** launched a massive project to establish local training programs at the TVET level based on international standards, with two new schools, Saudi Petroleum Services Polytechnic (SPSP, a partnership with Saudi Arabia Chevron) and the National Industrial Training Institute (NITI). SPSP offers a two-year technical program with courses in English, employability skills, and

health and safety among others; the curriculum is accredited by the **U.K.'s** City & Guild and the International Association of Drilling Contractors. The government also contracted globally recognized Petrofac Training Services to operate and contract a to-scale drilling training center (Andrews and Playfoot 2015). Likewise, BP contracted Petrofac together with **Russian-based** TTI International to establish a training school in Baku, Azerbaijan, to supply their needs for the Azeri-Chirag-Gunashli oil field and Shah Deniz gas fields. Graduates also receive City & Guild Level 2 accreditation (Petrofac 2016). In **Australia**, petroleum engineers must be registered with the Society for Petroleum Engineers (SPE) in order to work in the industry. SPE Australia works with the International Society for Petroleum Engineers to ensure that only graduates who meet international standards can register (Engineers Australia 2016).

An optimal education for the industry must entail practical experience. This includes apprenticeship programs, internships and "real-model" training facilities. Several countries around the world have adopted programs in which practical experience is an essential part of education for the industry, with specific qualifications attached. The different approaches taken vary by length, organization and incentives, etc. **Saudi Arabia's** NITI requires a six- to 12-month job placement; **Norway's** apprenticeship program is for 12 months; while the **U.K.** requires a full two years for its apprenticeships. In terms of organization, Norway and the U.K. apprenticeships for the industry are managed nationally through centralized offices that coordinate directly with firms to place students and ensure that firms dedicate sufficient time and qualified personnel to work with the apprentices (Andrews and Playfoot 2015). Statoil, Norway's oil and gas company, leads by example in this area and is the largest apprenticeship company in the country, thus encouraging other firms to follow suit (Statoil 2016).

In addition, in some countries, these apprenticeships are incentivized by government through subsidies. **Nova Scotia, Canada,** offers a wage subsidy for employers hiring students and new graduates from Nova Scotia universities and community colleges (Nova Scotia Department of Energy 2016). **Malaysia** offers a double tax deduction incentive for related expenses incurred during its internship programs (TalentCorp Malaysia). **Norway** provides firms with a subsidy of approximately US $12,000 per apprentice per year to encourage firms to take on more students (Andrews and Playfoot 2015). An alternative model includes one in which the state, together with educational institutions, establishes true-to-scale training facilities to provide this hands-on experience. **Singapore's** Economic Development Board, for example, established the Chemicals Process Technology Center with Nayang Polytechnic to provide pre-employment training for 800 students per year for petrochemical operations. They also open the facilities for up to 8,000 employees of the petrochemical sector to receive additional instruction (Carpenter and Kiong Ng 2013). **Saudi Arabia** has followed this example with the development of the Dhahran Training Center with full-scale operations for training drillers for the sector (Arabian Drilling Company 2016).

6.2. Local Content

The analysis of the oil and gas value chain revealed a tiered production system with captive governance relationships between lead firms and suppliers. This type of governance implies that production chains are fairly closed and large corporations exercise a strong influence over the supply chain. To increase positive spillovers from oil and gas production on their territory, host countries introduce various policies to increase local content in the operations of oil and gas companies. Approaches to local content development also vary, from fixing regulatory targets and obligations to setting flexible action "vector" with no exact measurement of "local" inputs or outputs. This part of the report draws on the experiences of some of the most successful mineral

producers: Australia, Canada (Nova Scotia) and Russia.

"Local content requirements (LCR) are provisions that commit foreign investors and companies to a minimum a threshold of goods and services that must be purchased or procured locally" (UNCTAD, 2014). Russia and Kazakhstan set LCR targets for goods and services that must be procured locally, and they set goals on local workforce participation. Australia and Canada use a flexible approach, where oil companies are required to attract local suppliers without hard percentage targets. The appropriate LCR approach is conditioned on local capabilities. Firms in developing counties often lack technical expertise or experience to engage with foreign partners in sophisticated operations. However, in developing countries, there is a clear need to increase returns and improve the economic, social, and environmental sustainability of extractive industries.

The recent downturn in the oil industry and Kazakhstan's accession to the WTO in 2015 has changed the environment for the country. Now, it has to compete for investors and prepare local firms for more competition with foreign companies before the end of the transition period in 2022. Besides, Kazakhstan is developing a new Subsoil Code to be introduced in 2018. Thus, it is appropriate to evaluate policy results and to adjust the approach to LCR now, when the country and the industry are undergoing an important policy and market shift.

Despite having a range of policies, Kazakhstan has had limited success in promoting local participation in the global oil and gas value chain. Some of the reasons behind low efficacy of policies are a decentralized approach toward improving local suppliers' competitiveness, poor coordination among stakeholders, and inconsistency and lack of focus on long-term outcomes and objectives. Kazakhstan needs to improve upon policies already in place and consider implementing proven set of actions. The following section discusses international best practices that have been successful in creating an enabling environment for local supplier development.

According to the best practices, a core element of LCRs is fair and full opportunities for local firms to participate in the procurement process on a competitive basis. This requires oil firms and operators to increase the visibility of their procurement needs and practices by submitting detailed production and development plans. For example: Australian Industry Participation plan (AIP) and Benefit Plan in Nova Scotia. Those plans require firms to submit detailed plans on how they intend to identify local firms to participate in the procurement process, including the distribution of information in a timely manner to local suppliers (World Bank, 2013). In Australia, foreign firms are encouraged to include local firms in their global supply chains. In Canada, firms have to provide a detailed assessment of potential of local firms to do the job required (Kean, 2016). This requirement flows down to all contractors and subcontractors, for which the lead firm is held accountable. The plan must be approved before work authorization may be granted (Canada-Nova Scotia Offshore Petroleum Board, 2011).

Russia implements a strict regulatory approach to local content development. Yet, in addition to having government set percentage targets on local labor, goods and works, Russian companies strive to create competitive a local supplier base. For example, Sakhalin Energy Investment Company actively implemented a Russian supplier development program aimed at promoting development opportunities of the Russian business and to increase its participation in the project "Sakhalin-2." An important component of the program is an educational module that includes trainings on health, safety, quality management system, skills to participate in the company's tenders and workshops with foreign companies. The program also includes measures to support Russian companies to ensure the passage of technical skills that help to approve suppliers "Sakhalin Energy," included in the list. In 2015, they conducted 15 seminars for 238 specialists from 99 companies. Moreover, they expended the number of possible suppliers through special

assessment with certification (Sakhalin Energy 2016).

To provide equal conditions for local and external suppliers, it is crucial to reduce information asymmetry to ensure that local firms have a fair opportunity to express interest in bids. Foreign companies are obligated to inform local firms about upcoming tenders in an effective and nondiscriminatory way (usually through a website). For instance, Russia's "Shtokman Development AG" (SDAG) develops gas and condensate fields in the Barents Sea with France's Total and Norway's Statoil. To ensure participation of local firms, SDAG created a database of potential Russian contractors and suppliers. It is a unified, updatable source of information about Russian oil and gas enterprises and service companies and a list of services, equipment and components they provide. In addition, SDAG commits to fully and openly inform companies about its plans and action related to Russian content activities and provide clarifications whenever required.

To provide relevant information on local suppliers' capabilities, governments, associations or private firms often create a special web platform, which displays updated information and serves as a catalog. Australia's Industry Capabilities Network is probably the most sophisticated example of the supplier guide; and the online resource (www.icn.org.au) helps to set linkages between suppliers and operators. It serves as a marketplace where operators can publish their procurement plans and suppliers can adequately display their skills and competences. In addition, the Buy Australia at Home and Abroad Program (2010) funds Supplier Advocates and a Supplier Advisory Forum to boost linkages between suppliers and major projects in the sector (I. Department of Industry, and Science, 2016). Nova Scotia's Department of Energy actively works with local industry associations to gather information about local firm capabilities, reaches out to new investors early to discuss their procurement needs and facilitates introductions to local firms and their facilities with site tours (Kean, 2016). Furthermore, they require that firms open a local procurement office with the necessary levels of authorization and staff for sourcing (Canada-Nova Scotia Offshore Petroleum Board, 2011; Department of Industry Innovation, 2013).

There is an analog of such a website in Kazakhstan named "Alash," launched in 2016 by the Ministry of Energy (KazService, January-March 2016). The database was created to eliminate market fragmentation and information asymmetry. Currently, there are three "procurement groups": the national company KMG and its subsidiaries, participants of product sharing agreement (PSA), and small local firms. It is virtually impossible for small and medium local firms to break into supply chains of KMG or PSA due to the pre-existing network of preferred suppliers for both types of buyers. It is too early to assess the effectiveness of Alash; however, it is important to provide high transparency and nondiscrimination in the functioning of the database, the bidding process and other procurement operations.

All of the above must be followed by a local supplier development program and a measurement system to strengthen the industry's research and development (R&D) ecosystem. Nova Scotia, for example, uses the highest "Work Expenditure Bid"—including not just operational aspects, but also planned investments in employment and training and R&D—as the principal criterion for decision-making for license awards (Canada-Nova Scotia Offshore Petroleum Board, 2012).

Gorgon (Australia), a joint project led by Chevron (47 percent), ExxonMobil (25 percent) and Shell (25 percent), has had a very positive impact on the local economy and suppliers. The joint project developed a training facility for employees, engineers and technical staff in Western Australia to house four training programs. Since the beginning of the project, more than US $45B has been spent, resulting in more than 900 local contractors, and 19,000 workers, directly employed.

Joint ventures and private supplier development investments have become an effective vehicle for

knowledge, skills and technology transfer. In Nova Scotia, the estimated cumulative value of the technology transfer associated with the Sable Project since 1998 exceeds US $32 million (2015 Sable Project Canada - Nova Scotia Benefits Report, 2016).

Besides, in Nova Scotia, several agencies, including Export Development Canada and Nova Scotia Business Inc. (NSBI) provide options such as access to low-cost finance by providing loan guarantees (Export Development Canada, 2016; Kean, 2016; NSBI, 2016). NSBI, together with the Department of Energy, teaches local firms to navigate significant administrative challenges related to participation in global oil and gas supply chain, covering a range of processes from simple ones to how to complete required paperwork to obtain required certifications to work in the industry (Kean, 2016; NSBI, 2016).

Nova Scotia also requires that a certain percentage of either profits or production cost operations be directed to local R&D expenditure, with the goal to create export oriented technologies and capabilities (Canada-Nova Scotia Offshore Petroleum Board, 2011). The province requires firms to educate and train local staff and prepare a development plan indicating how local employees will be groomed for higher professional levels as the project advances (Canada-Nova Scotia Offshore Petroleum Board, 2011; Center for Energy Economics; Kean, 2016).

The Australian government, together with universities and industry, establishes sectorial Centers of Excellence in key locations. In addition, the Commonwealth Scientific and Industrial Research Organization undertakes continued research with industry players and other universities, such as the Subsea Pipelines Collaboration Cluster, which has launched its new technologies in oil fields around the world, as well as producing some 40 Ph.Ds. (Government of Australia).

To ensure integration of small local suppliers into the GVC and their subsequent upgrading, it is crucial to run an export support program. The Australian approach recognizes the need to quickly insert local firms into operations abroad (Australian Industry Participation in Major Infrastructure Projects, 1997; World Bank, 2013). The Buy Australian at Home and Abroad program allocated some US $3 million over four years to help create access for Australian suppliers in the resources sector, both domestically and in foreign projects (ICN, 2016). Austrade also actively promotes Australian firms abroad, using instruments such as Industry Capabilities Reports to share with prospective buyers.

In Canada, an export credit agency—self-financing, Crown corporation operates at arm's length

from the government—provides loans for SMEs, insurance and education in the field of international trade. For example, in 2015, they facilitated US $104.2B., where US $22.7B was allocated for extractive industry (EDC 2015).

In 2007, Kazakhstan created an export promotion agency, named KAZNEX INVEST. As an export promotion agency, KAZNEX INVEST conducts trade missions, participates in exhibitions, covers marketing expenses in foreign countries, and conducts seminars for exporters and firms that are willing to export and to make export market overviews. However, the agency has been working with exporters of goods, not services. As international trade in services grows, it is a logical step to extend support to high-value service exporters too.

6.3. Policy Recommendations

Human Capital

Kazakhstan is a newcomer in the oil and gas sector, and it has the opportunity to take advantage of the best practices developed by countries with decades of experience in the industry. Countries with a mature industry understand the cyclical nature of the sector, and that a downturn such as today's will eventually shift direction. They take advantage of downturns to prepare their human capital to be ready for the next wave of industry development. Likewise, Kazakhstan should take this opportunity to develop its workforce and catch up with the required skills of the leading companies on the field.

One of the pathways to upgrading would be adaptation of a participatory approach to the development of education system. In Kazakhstan, establishment of a comprehensive workforce development strategy could mitigate the challenges in the area of human capital.

This midterm strategy of human capital development, first and foremost, should be developed in close collaboration with oil and gas operators, oil-field service companies, education institutions (both higher education and TVET), the Ministry of Energy, Ministry of Education and the Ministry of Labor. There are several essential elements to the strategy:

- *An industry overview with detailed information on the existing workforce and its composition* in Kazakhstan's oil and gas and oil-field industries. In particular, this section of analysis may contain the number of graduates by occupation over the past five years. The analysis should cover current labor requirements, detailed job profiles, and average wage by occupation.
- *Provide a detailed employment forecast as an important part of the strategy* that should be published and available online as an up-to-date database. The Ministry of Labor, which already produces regional employment forecasts, could administer these industry specific analysis and forecasts based on industry surveys.
- *Making the information available to all interested parties is important for closing the gap between industry needs and the education system.* Creation of an industry specific website with the current and forecast information on careers in the oil and gas industry containing the description of skills required, priority occupations, earnings and employment outlook (which can be fairly general, such as "weak, moderate, strong,") will allow the supply side (i.e. high school graduates, students, workers and education institutions) to make informed decisions regarding their professional paths, master their qualification and adjust curricula accordingly.
- *Identification of industry trends in all segments of the value chain, domestically and internationally*, will help universities and colleges tailor their study programs and eventually raise

the quality of teaching. Overall, it will align positions of state bodies and private sector, and their vision of the future of the industry; thus, Kazakhstan can improve responsiveness of policies to the market needs. This section can be developed by the professional associations and industry experts.

- *The core of the strategy will review the education system for oil and gas. The review will evaluate by education levels—university, TVET and professional training opportunities—relevant institutions and their potential* (for instance, staff, technical base) and professional occupations taught in the institutions. Another indispensable element is the review of polices and incentives in attaining education or certain skills enhancement (grants, scholarships, tax credits) provided by the government and the private sector.
- *The workforce development strategy should entail a lifelong approach to education.* A part of the program shall be dedicated to the review of existing opportunities for career enhancement, which so far have largely remained in the purview of individual companies.
- *The concluding section of the program will contain policy actions and stakeholder collaboration schemes* (e.g. quarterly meetings, conferences, industrial placement programs, attracting professionals to teach in colleges and universities, etc.). The latter can be organized in following the example of North Carolina community colleges, where industry professionals come to teach a few hours a week to a local college as part of their community service. In Kazakhstan, this practice can be tied to work permits for foreign workers who can transfer their rich experience to Kazakhstani co-workers and students, or it can incentivize in other ways. Another mechanism to attract students to TVET is provision of student loans that workers start repaying later in their careers, when their salaries reach a certain level[12]) and other measures to develop high-quality labor force for oil and gas and oil-field service industries in Kazakhstan.

The role of government in leading these efforts to improve the quality of human capital and building strong linkages between industry and the education system cannot be underestimated. Government bodies will have to gather information regarding industry trends and plans, priority occupations and the demand for labor, and, more importantly, *effectively disseminate* that information. Thus, a government-run website, providing the results of the industry and Ministry of Energy surveys, will be a central tool to effectively boost the workforce development strategy.

In developing and implementing this type of program, it is crucial to make the measurement, monitoring, evaluation and program revision an ongoing effort. Stakeholders should adopt an evidence-based approach to policymaking and implementation processes. To ensure a flexible yet transparent strategy, industry associations such as the energy producers' association KAZENERGY and the service providers' association KazService can take lead in its development, implementation and monitoring, with participation of all stakeholders.

Success of such strategy may create a precedent for other key industries, for instance, agribusiness or mining sector, to follow suit. The Government should encourage replication of the most successful practices.

[12] This practice called Advanced Learner Loans works in the U.K. https://www.gov.uk/guidance/24-advanced-learning-loans-an-overview

Local Participation

All countries that have successfully implemented local supplier development policies and managed to break into closed circle of supply chain in the industry have focused on fostering competitiveness of local firms both at home and abroad. Clarity of the institutional and legal framework is an important condition of the ultimate LCR success. A potential pathway to upgrade the oil industry of Kazakhstan is to develop an adjacent oil-field service sector, which picked up in 2000s but currently finds itself in a situation of high uncertainty and distress. Local content development is a suitable approach to enhance the local supplier base, but the policy should be altered to meet the new challenges of the industry.

There are a few steps that Kazakhstan can take, drawing upon lessons from other countries:

- **First, there should be a coherent policy and institutional framework to promote upgrading in a systemic manner and supplement existing targets.** Kazakhstan may develop a comprehensive development strategy for the oil-field service industry; and a designated private or a joint government/private agency can oversee the execution of the strategy.
- **The strategy should contain the following components:** *capability development tools,* including trainings (for instance, in administrative issues or business development); *access to cheap credit* for service companies, especially SMEs; *tools or subsidies to support getting international certification*; *R&D support* (e.g. establishment of R&D centers, preferably with participation of local universities); *technology transfer mechanisms* (joint ventures, cooperative research, etc.); *market research* at home and abroad to map local suppliers' capabilities and opportunities in the global market; and *export support*. It should be noted that the government's role and government financing are crucial, in particular for R&D development and matchmaking of foreign oil and gas companies and relevant local firms that should follow from the research efforts.
- **Second, the oil-field industry should be liberalized.** Bloated structure of the state-owned KMG and its inflexibility not only places a great burden on the state budget, but also impedes efficient extraction of natural resources, raising the cost of labor and slowing the development of the oil-field service sector. Instead of subsidizing inefficient producers and service providers for a long period of industry downturn, Kazakhstan can increase sector agility while ensuring talent retention. For instance, after the privatization of numerous quasi-state service companies, Germany and Australia introduced short-term "unemployment" payments to the workers of idle companies.
- **Third, competition law should be rigorously applied to the oil and gas sector, particularly, in procurement and outsourcing in the industry.** In Kazakhstan, procurement in the oil and gas sector is virtually exempt from the anti-trust regulation, and the practice of special treatment of state-owned companies and affiliated companies needs to be eliminated.

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