

HOW TO UPGRADE TECHNOLOGICAL SERVICES FOR THE UPSTREAM OIL VALUE CHAIN IN KAZAKHSTAN

Framework Step:

STEP 3: Unlock opportunities for in-country shared value creation: local workforce and supplier development

3. 1. A What can host governments do?

- Undertake a baseline assessment and build credible and reliable statistics on existing industry capacity, size of local enterprises, level of participation, supplier landscape and institutional capacity for skills and small and medium-sized enterprise development to inform strategic planning, required skills upgrading and technical training activities.
- Prioritise approaches that enable progress towards achieving common objectives, goals and targets over compliance with and enforcement of local content quotas.
- Match training opportunities with documented industry demands, in priority segments/ activities with the highest growth potential.

3. 1. B What can the extractives sector do?

- Clearly articulate the success factors for participation in extractives sector value chains (price, delivery reliability, safety, quality) and conformance to international standards (environment, labour, industry-specific requirements).
- Support capacity building for specific job or value chain-related skills, either directly or through joint training programmes/centres.
- Assess short-term costs associated with workforce and supplier capacity building initiatives as investments that will reduce operating costs in the long term.

3. 1. C What can the extractives sector do?

- Collectively assess existing industry capacity, level of local participation, and supplier 'landscape', to inform strategic planning, required skills upgrading, and technical training activities.
- Identify and prioritise quick wins for local workforce and supplier participation and leverage other opportunity areas for long-term collaboration.

STEP 4: Support and contribute to innovation leading to new products and services

4.1. What can host governments do?

- Support research and development efforts to identify, adapt, and transfer technology, making sure that these efforts are responsive to private sector demands. In doing so, develop ties with local universities, public research institutions, and participate in collaborative initiatives.

Tags:

- local employment
- local supplier participation and development, including SMEs
- marginalised groups (women, indigenous people)
- skills development and upgrading
- access to credit
- shared infrastructure (transport, water, power)
- technology transfer
- innovation
- economic diversification
- Other: _____

Problem Statement:

The oil and gas sector in Kazakhstan has mostly exported primary products with little value addition. In analysis from 2009, the Kazakhstani government concluded that raw resources constituted the major part of exports, while services and products were not competitive enough. Another conclusion was that the supply of qualified labour and their ability to meet specific industry demand was limited. Against this backdrop, multinationals such as Shell, were sending geochemical samples for testing to laboratories abroad at additional cost, thus leading to business inefficiency. Yet, business investment in research and innovation was insufficient for transformative upgrading, while strong local content requirements in Kazakhstan continued putting pressure on multinationals to form linkages and spend at least 1% of subsoil revenues on R&D (OECD, 2017).

Parties Involved:

- Shell
- KazMunayGas (KMG) (Kazakhstani SOE)
- Government of Kazakhstan (President and Ministry of Energy)

Common ground:

As part of the collaborative exercise between the government, industry and research organisations on developing the "Kazakhstan Upstream Oil and Gas Technology and R&D Roadmap", participating stakeholders concluded that there was room for well-targeted strategies, whose implementation would require an upgrading of existing capabilities and institutions. At the end of this road-mapping process, Shell and other extractive industries, in collaboration with government, identified areas of linkages for local R&D, value addition and upgrading.

Consequently, Kazakhstan's policy goal of capacity building, upgrading and value addition in the extractive sector converged with Shell's objective to improve business efficiency, by cutting additional costs deriving from sending geochemical samples abroad for testing. Therefore, based on the country's vision and the specific business need identified by Shell, and within the framework of the Roadmap, Shell and the state-owned oil company KazMunayGas launched the *Geochemical Centre of Excellence* in Kazakhstan. Contributing to the establishment of an in-country laboratory facility led to cost and time savings in the medium- to long-term.

Actions taken:

In 2013, in accordance with the multi stakeholder agreement on the "Kazakhstan Upstream Technology and R&D Roadmap" coordinated by the Ministry of Energy, Shell presented the government with a proposal to create a geochemical laboratory in Kazakhstan in cooperation with KazMunayGas. With the government's subsequent approval, in a two year time period, Shell and KazMunayGas built the first Kazakhstani *Center of Excellence for Geochemical Studies* at the laboratory complex in Atyrau. Shell invested USD5 million in infrastructure and training of highly skilled workforce.

The new laboratory provides geochemical services and research for exploration, development and production, using a wide range of new technologies, including geochemical fingerprinting. Fingerprinting provides greater understanding, on a molecular level, of the horizons and accumulations where hydrocarbons are present, thus making it easier to locate new hydrocarbon reserves. Better understanding of these processes is crucial for developing exploration strategies and can reduce the risk of drilling expensive dry holes, and, therefore, maximise the investment. Instead of producing from only one reservoir per well, the fingerprinting technology allows production from

several reservoirs simultaneously, leading to the drilling of fewer wells in the process. This directly affects field development planning, such as the number of wells needed to effectively drain the field. The installation of this new technology contributed to addressing some of the industry's major challenges in Kazakhstan, particularly in view of plans to extract oil at extreme depth. The geochemical laboratory enables Kazakhstan and the oil and gas industry to discover new hydrocarbon reserves and reduces the cost of oil exploration activities, as drilling one well can cost between USD20 to USD200 million, and conducting geochemical analysis in the laboratory costs a few thousand dollars. Due to the new laboratory, these costs have been reduced significantly. The use of these cutting-edge technologies and expertise enabled the laboratory to deliver high quality, new data, improving field economics, by maximising oil production.

Shell financed the procurement of the new equipment and facilitated the training of local staff. Regular, biweekly teleconferences between Shell technical specialists and local KazMunayGas staff working in the laboratory were held to monitor the performance of the new technology and the interpretation of data. Numerous direct training sessions were held in Atyrau and the Shell laboratories in the Netherlands, contributing to the development of hands-on experience. Due to the use of cutting-edge technology and targeted specialised training, the geochemical laboratory contributed to Kazakhstan becoming a regional hub for geochemical studies. Today, the laboratory serves the national oil company KazMunayGas and through its participation in other projects as either a shareholder or joint venture partner, the technology is benefitting other businesses in the wider region as well.

The first successful reservoir geochemistry project was undertaken last year on behalf of Salym Petroleum Development in Russia, leading to significant cost savings. Geochemical fingerprinting replaced expensive PLT (Production Logging Tools) surveys (> USD 3 million per survey) and consequently, a long-term contract for using the laboratory's services has been signed with Salym Petroleum Development. During the first year of production from the Kashagan oil field (with seven partners) when unexpected reservoir performance was observed, the laboratory provided geochemical characterisation of reservoir fluids which supported the wider investigation into the root cause of these limitations.

For the targeted training of highly skilled staff, Shell selected Kazakhstani graduates from local universities who are specialised in chemistry and biology and retrained them into geochemists, in such a way that they could interpret the results of analyses conducted in the laboratory. Where specialised knowledge was necessary, some employees were sent to the Netherlands for training. Today, the laboratory has around 10 employees, including laboratory assistants. In 2017, the geochemical facility in Atyrau was handed over to KazMunayGas. While KazMunayGas operates the laboratory, Shell continues to provide expert support and quality assurance.

Obstacles:

- Government local content policies on using the extractives sector as driver for in-country capacity building and upgrading can create challenges for multinationals to form economically feasible, effective linkages with local firms and research organisations.
- There was a lack of information within the industry and the country on what types of initiatives were viable, which were needed, and how best a company could invest to add value and avoid additional costs due to existing inefficiencies.
- The number of geochemists in Kazakhstan was very limited; therefore, chemists and biologists had to be retrained into geochemists.

Enabling factors:

- The Roadmap allowed Kazakhstani and foreign stakeholders to interact more directly and develop a mutual understanding of existing technological challenges and potential solutions, providing guidance on possible areas of effective public-private collaboration.
- The geochemical laboratory was implemented on the basis of the information collected during the Roadmap process. The Roadmap provided the information necessary for Shell on how to meet the interests of the government, while also responding to a real business need.
- For the creation of the geochemical laboratory, the partnership between Shell and KazMunayGas was essential. The Kazakhstani government and KazMunayGas owned the process of creating the Roadmap and building the geochemical facility. This ensured sustainability of the project and a full alignment on common goals between Shell and the government, maximising capacity development.
- The capability of KazMunayGas to master the innovative technology, using it for the benefit of the national and regional economy contributed to the effective implementation of this project.

Lessons Learned:

- The catalytic effect of knowledge and technology transfer represents one of the main opportunities for in-country capacity building and upgrading:
 - (i) Teaming up with multinationals can be a crucial source of expertise and know-how for the local industry. Shell helped to translate its global experience into local solutions and it continues to support the laboratory with data acquisition and interpretation.
 - (ii) High quality and specific demand of multinationals can provide incentives to upgrade technologies, services and products.
 - (iii) Linkages can lead to significant cost saving for the extractive industry in the medium- to long-term by using in-country services and products.
- The creation of the geochemical laboratory, involving Shell and KazMunayGas as two important actors in the upstream oil and gas industry as well as the government, offers a replicable example of a proactive initiative that can support a cooperative and forward-looking approach, generating co-benefits for the industry and host countries.

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