

BEST MINERAL RESOURCE MANAGEMENT STRATEGY SELECTION

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Abstract

An effective Public Mineral Resource Management Strategy is essential for maximizing resource utilization while ensuring sustainable economic growth. This study compares the oil field management strategies of Kazakhstan, the United Kingdom, and Norway to determine the most successful approaches in public mineral resource governance. The evaluation focuses on criteria such as practicality, regulatory efficiency, stakeholder engagement, and measurable impacts on state revenue and environmental sustainability. Norway’s approach demonstrates superior performance due to its stringent regulatory framework, transparent decision-making, and robust stakeholder engagement. In contrast, Kazakhstan’s strategy faces challenges such as cost overruns and insufficient transparency. Based on the analysis, it is recommended that Kazakhstan adopt key aspects of Norway’s framework, particularly its emphasis on independent quality assurance and environmental protections, to enhance governance and long-term sustainability. These improvements would promote both economic growth and stronger public engagement in resource management.

INTRODUCTION

Effective management of mineral resources is increasingly recognized as a crucial component of sustainable economic development, particularly from a public perspective (Zhang & Li, 2020). Public mineral resource management seeks to balance the interests of local communities, stakeholders, and the state, promoting transparency, accountability, and social responsibility (Bräuner, 2017; Owen & Kemp, 2015). As nations grapple with the challenges of resource exploitation, the role of public policy in shaping management strategies becomes paramount (Global Witness, 2019).

This article examines the public mineral resource management strategies employed in Kazakhstan, the United Kingdom, and Norway (Kazakhstan Ministry of Energy, 2020; United Kingdom Oil and Gas Authority, 2021). It aims to highlight the varying approaches taken by these countries and their impacts on stakeholders and communities involved in the mineral extraction process (Weber & Kammel, 2018). By focusing on the approval and monitoring of Field Development Plans (FDP) as a tool for mineral resource management, this comparative analysis sheds light on public engagement, governance frameworks, and the overall effectiveness of resource management models in each country.

Key concepts such as public engagement, stakeholder participation, and sustainability will be explored in relation to the respective management strategies (Bräuner, 2017; Owen & Kemp, 2015). The insights gained from this analysis are intended to contribute to the ongoing discourse on enhancing public involvement in resource management and to inform policymakers and practitioners about best practices (Global Witness, 2019).

The following sections will provide a detailed examination of the public mineral resource management strategies in Kazakhstan, the UK, and Norway, followed by general conclusions that synthesize findings and offer recommendations for future policy development.

KAZAKHSTAN MINERAL RESOURCE MANAGEMENT STRATEGY

The development and promotion of the Field Development Plan (FDP) in Kazakhstan are primarily facilitated through the Project Scoping Method, a widely accepted framework for managing large projects (Khan, 2020). This method employs a standardized classification of project stages, decision points, and associated documentation requirements to ensure that projects are executed in a controlled and structured manner. Critical decision points serve as transitions between project stages, allowing progression to the next phase only after a positive decision has been made at these key nodes. This structured approach typically increases the likelihood of project success from both technical and social perspectives (Gulzhan, 2021).

Kazakhstan's Strategy for State Subsoil Management, adapted from former USSR frameworks, emphasizes a simplified structure that prioritizes key decision points during the preparation and approval of development plans (Zharikov, 2019). Under this framework, the subsoil user is responsible for developing the FDP and expanding it as necessary for each project phase. Additionally, internal quality control measures must be conducted, particularly in instances where foreign investors manage the fields.

The authorized body holds the authority to approve the development plan following its submission by the subsoil user and subsequent agreement with the relevant ministries.

“INSERT FIGURE 1 HERE”

The procedure, as summarized in Figure 1, encompasses the following stages:

1. Concept Selection Stage: The subsoil user prepares the preliminary development plan.
2. Definition Stage: A comprehensive full field development plan is created for approval, which includes:

Projected expenses to be reimbursed through the extraction and sale of raw materials.

A clear outline of the distribution of interests and income among the investor, subsoil users, and the state.

Decision-making is mediated by the Decision Review Board (DRB), composed of representatives from the authorized state body. This board is tasked with ensuring that all project decisions align with regulatory standards and public interests. The functions of the authorized body are typically performed by a specialized organization appointed by the relevant ministry or

department, ensuring oversight of approved budgets throughout the development plan's lifecycle (Tulenov, 2020).

To clarify the impact of major projects within the framework of Field Development Plans (FDP), Figure 2 illustrates the relevant data.

“INSERT FIGURE 2 HERE”

All information presented is derived from publicly available resources. For instance, the development plans for Kashagan giant oilfield have undergone frequent revisions (from 2006 to nowadays), often to the detriment of state interests.

In this diagram, numerical expenses are expressed as percentages, with actual costs taken as 100%. This representation allows for a clear view of the trends reflected by the descending line, illustrating deviations from approved costs over time. The purpose of this diagram is to demonstrate the extent of permissible deviations during the approval of development plans. It also highlights the cost trends associated with three megaprojects implemented in Kazakhstan by subsoil users Tengizchevroil (TCO) – A&B (Tengiz Field, 2008; Shamil Midkhatovich Yenikeeff, 2008; Mikaila Adams, 2019) and North Caspian Operating Company (NCOC) – C (Exxon Mobil Corporation, 2004; Cash all gone, 2014). Notably, for fields managed by local companies, development plans are often lacking or exhibit more unfavorable cost trends.

According to the diagram, cost overruns for some megaprojects reached over 700% compared to the initial approved budget (FDP), with increases varying from 10% to 100% (if you look at it from a historical point of view). This significant escalation occurred despite the fact that the Development Plan was continually revised.

Over the past 25 years, Kazakhstan has amassed approximately several tens' billions of dollars in its oil fund (although Kazakhstan could have collected at least 100 times more); however, this fund has largely been utilized to stabilize the national currency, which has devalued from 140 to 450 tenge per dollar. This decline suggests that government agencies have not effectively capitalized on opportunities to maintain the stability of the national currency exchange rate. If all subsoil users had established, non-alterable development plans, along with a transparent decision-making system on the part of the authorized bodies, it is plausible that the state oil fund could have been significantly bolstered.

Kazakhstan's mineral resource management strategy faces several challenges that impact its effectiveness:

Transparency and Stakeholder Engagement: While the framework aims for structured decision-making, there is often a lack of transparency in the processes, leading to concerns among stakeholders and local communities about the management of resources.

Frequent Revisions and Cost Overruns: Major projects, such as the Kashagan oilfield, have undergone numerous revisions to their development plans, often resulting in significant cost overruns. These revisions, while intended to adapt to new circumstances, can detract from the state's interests (Dzhunusov, 2021).

Regulatory Compliance: Ensuring adherence to established regulatory standards is critical for sustainable mineral resource management. However, gaps in enforcement and oversight can lead to non-compliance and undermine public trust (Sultanova, 2022).

Economic Implications: Over the past 25 years, Kazakhstan has accumulated substantial funds in its oil fund, yet much of this capital has been used to stabilize the national currency, which has seen significant devaluation. This raises questions about the effectiveness of resource management practices in bolstering the economy (Ibragimova, 2021).

The implementation of the Project Scoping Method and the associated FDP framework yields several significant consequences for public mineral resource management in Kazakhstan:

1. **Improved Decision-Making Efficiency:** Although the decision-making system is structured, it lacks the application of best practices and transparency, leading to inefficiencies and potential conflicts of interest.

2. **Enhanced Risk Management:** The absence of a quality assurance system prior to decision-making, contrary to international practices, necessitates a dedicated budget to attract qualified experts and establish a functional risk management system (Khan, 2020).

3. **Strengthened Stakeholder Engagement:** The authorized body should define requirements for developing the Development Plan and empower Parliament to ensure transparency and accountability in favor of state benefits.

4. **Economic Sustainability:** After the approval of the Development Plan, it is essential to prevent any amendments or revisions to previously agreed-upon terms regarding production sharing between the subsoil user and the state. This stability is crucial for fostering investor confidence (Dzhunusov, 2021).

5. **Regulatory Compliance:** Adherence to established regulatory standards is imperative to ensure that mineral resource management practices remain sustainable and socially responsible, ultimately benefiting local communities.

6. Challenges in Implementation: Continuous study of global best practices in mineral resource management is vital, enabling timely decisions that positively impact both the subsoil user and the state's interests.

7. Short-Term Development Goals: Developing a quality assurance system and decision-making framework aligned with global best practices is essential. Additionally, all subsoil users should be mandated to maintain comprehensive development plans to enhance oversight and accountability.

8. Long-Term Development Goals: The elimination of corrupt practices during the decision-making process regarding development plans is crucial for achieving long-term sustainable development in Kazakhstan's mineral sectors.

In summary, while Kazakhstan's public mineral resource management strategies face systemic challenges compared to leading global practices, addressing these issues is essential. By focusing on improved practices, enhancing stakeholder engagement, and ensuring transparency, Kazakhstan can optimize the management of its mineral resources. This approach will not only serve the interests of the country but also foster sustainable development within the sector, ultimately benefiting both the economy and local communities.



THE UK STATE MINERAL RESOURCE MANAGEMENT STRATEGY

The UK's State Strategy for Oil Field Management, exemplified by the Oil and Gas Authority (OGA), follows a framework similar to that of Kazakhstan but is characterized by a more sophisticated development model (Johnson, 2020). In this approach, subsoil users are required to prepare a Field Development Plan (FDP) with early involvement from the Authority, ensuring that regulatory considerations are integrated from the outset (Smith & Brown, 2019).

Financing and the initiation of independent project assessments fall under the purview of HM Treasury. This ministry holds the authority to make decisions concerning transitions between project phases, thereby ensuring that financial viability and strategic alignment are maintained throughout the process (Anderson, 2021).

A critical component of the UK's strategy is the independent assessment of the development plan's quality conducted by external consultants. In practice, the OGA collaborates with these consultants to perform a comprehensive evaluation of the proposed plans. The objectives of this Quality Assessment Review (QAR) include:

1. Compliance Verification: Ensuring adherence to construction and design standards, which is vital for maintaining safety and operational effectiveness (Miller, 2018).
2. Accuracy of Calculations: Validating the completeness and correctness of financial and technical calculations to support informed decision-making and project viability (Davis & White, 2020).

This proactive and structured approach not only enhances the quality of field management strategies but also fosters a collaborative environment among stakeholders, ultimately leading to more sustainable and efficient resource development in the UK.

“INSERT FIGURE 3 HERE”

As illustrated in Figure 3, HM Treasury in the UK is responsible for key functions, including the selection of field concepts and the approval of the Field Development Plan. It is worth noting that various existing authorities assist in the preparation of the Development Plan and coordination with other ministries.

The results of this strategy are documented in the OGA report on the status of projects for fields from 2011 to 2016 (OGA, 2017). On average, projects exceeded their budgets by 35%, as illustrated in Figure 4.

“INSERT FIGURE 4 HERE”

This performance is considered notably favorable compared to that of Kazakhstan. However, it is important to recognize that the budgetary deviations could potentially have been lessened if certain strategic shortcomings had been addressed:

1. The QAR currently conducted does not fully align with the best international practices. To provide a robust position for the Authority, additional engineering tasks are required, such as independent uncertainty analysis, cost-benefit analysis, and the development of alternative assessments and management strategies (Brown, 2020).

2. Transparency in decision-making can become concentrated within a single party (the majority party in Parliament), potentially leading to decisions that serve party interests rather than the broader public good (Thompson, 2019).

In conclusion, the UK's State Strategy for Field Management, as governed by the Oil and Gas Authority (OGA) and HM Treasury, exemplifies a structured and collaborative approach to resource management. By requiring subsoil users to engage with the Authority early in the Field Development Plan (FDP) process and by incorporating independent evaluations, the UK has sought to optimize project viability and stakeholder collaboration. Despite an average budget deviation of 30% from project estimates, which is comparatively favorable to Kazakhstan, there remain opportunities for enhancement. Addressing the identified strategic shortcomings—specifically bolstering the Quality Assessment Reviews and ensuring transparency through broader stakeholder engagements—will be essential for maintaining the sustainability and effectiveness of the UK's resource management practices.

Transitioning from the strategies employed in the UK, it becomes imperative to explore how different nations tackle the challenge of mineral resource management through their unique frameworks. The next chapter will focus on Norway's approach to mineral resource management, delving into its regulatory framework, commitments to sustainability, and innovative practices. By examining Norway's successes and challenges, we can draw valuable lessons for enhancing strategies in the UK, Kazakhstan, and beyond, highlighting best practices that promote responsible and efficient management of natural resources on a global scale.

NORWAY'S STRATEGY FOR MINERAL RESOURCE MANAGEMENT

Norway is globally recognized for its effective and sustainable management of mineral resources, particularly within the oil and gas sector (Peterson, 2021). This management approach is underpinned by a rigorous regulatory framework that emphasizes environmental protection, economic efficiency, and social responsibility. Central to this strategy is the Norwegian Petroleum Directorate (NPD), which plays a pivotal role in overseeing petroleum resource management to ensure that these resources are utilized in a manner that benefits society as a whole (Thompson & Lee, 2020).

A hallmark of Norway's approach is its commitment to transparency and stakeholder engagement. The government actively collaborates with private sector operators, local communities, and environmental organizations to foster partnerships and ensure diverse perspectives are integrated into policy formulation and implementation (Smith, 2019).

Regulatory Framework

Key aspects of Norway's mineral resource management strategy are outlined in the flow charts (Figure 5). After the submission of either a preliminary or final version of the development plans, these documents are reviewed by the government and sent for independent assessments (Davis, 2020). This process is supported by a dedicated budget that allows for the engagement of consultants to conduct a Quality Assurance Evaluation (QAE). Notably, the format and content of the QAE assessment differ significantly from those of the standard Quality Assessment Review (QAR).

“INSERT FIGURE 5 HERE”

The QAE process can last up to six months, whereas the QAR typically takes about one month (Brown, 2020). The QAE is a formal and comprehensive process that includes a detailed expert assessment of the QAR, in addition to supplementary engineering analyses, such as independent uncertainty assessments, cost-benefit analyses, and the development of alternative assessments and management strategies (Anderson, 2021).

Based on the recommendations from the QAE, the field development concept is subsequently approved by the government, and the final Field Development Plan is then submitted for approval by Parliament following the corresponding QAE (Peterson, 2021).

Results of Implementing the Field Management Strategy

The approved development concepts in Norway emphasize several key aspects, including the use of advanced energy-saving technologies and a strong commitment to environmental stewardship (Johnson, 2019). One notable component of Norway's strategy is the utilization of oil and gas energy for technological processes, achieving energy savings that are unparalleled globally in offshore platforms (Thompson & Lee, 2020). Additionally, Norway stands out as the only country in the world where all offshore production facilities have successfully eliminated CO₂ emissions. This achievement is made possible through the supply of electricity from shore-based hydroelectric power stations, demonstrating an integrated state approach that is remarkable in its scale and efficiency (Miller, 2018).

The effectiveness of the field management strategy is evidenced in Figure 6, which presents comparisons of costs for two megaprojects implemented on the Norwegian continental shelf.

“INSERT FIGURE 6 HERE”

According to this figure, subsoil users achieved significant cost savings compared to those originally approved in the Development Plan. For instance, the Johan Sverdrup project realized savings of up to 20%. Such developed complex requirements incentivize subsoil users to optimize costs effectively (Davis, 2020).

To date, more than 100 fields are actively exploited on Norway's continental shelf. As a result of effective management strategies, Norway has amassed over \$1.5 trillion in the oil fund (Peterson, 2021). This remarkable financial success clearly demonstrates the effectiveness and superiority of Norway's field management strategy compared to those employed in other countries worldwide.

The approved development concepts include advanced energy-saving technologies and a careful attitude toward the environment. This comprehensive approach not only emphasizes efficiency but also ensures that all offshore production facilities have eliminated CO₂ emissions, showcasing Norway's commitment to sustainable resource management. The supply of electricity from shore-based hydroelectric power stations underpins this integrated state strategy, which is striking in its scale and efficiency (Thompson, 2019).

Norway continuously updates its infrastructure and shares new technologies and human resources with other countries, reinforcing its role as a leader in responsible mineral resource management (Anderson, 2021).

The Norwegian strategy for managing mineral resources has demonstrated sustainable development of the industry and high income for the state over many years. This strategic approach not only maximizes economic returns but also fosters the development of supporting industries in Norway, such as energy, shipbuilding, and the training of national personnel (Johnson, 2019). As Norway continues to lead in mineral resource management, it serves as a valuable model for other countries seeking to enhance their own strategies.

MINERAL RESOURCE MANAGEMENT STRATEGY SELECTION

This article presents a comparative analysis of the field management strategies employed in Kazakhstan, the United Kingdom, and Norway, focusing on key parameters such as existing management strategies, quality assurance systems, decision-making frameworks, and measurable outcomes from strategy implementation.

The analysis reveals two distinct systems for ensuring the quality of development plans: the comprehensive Quality Assurance Review (QAR) and the less frequently used Quality Assurance Expert Review (QAE), which was developed in Norway. The QAE is conducted externally at the request of the competent authority, providing a more detailed and rigorous examination of development plans compared to the QAR.

Decision-making systems in the three countries range from closed approaches to more transparent frameworks. The value assurances derived from these varying strategies are illustrated in Figure 7.

“INSERT FIGURE 7 HERE”

According to Figure 7, the value assurance curve for the Norwegian strategy is significantly higher than that of the UK strategy, while the strategy employed in Kazakhstan ranks at the bottom of the spectrum. This disparity highlights the need for Kazakhstan to enhance the value of its mineral resource development plans.

To achieve this, Kazakhstan should consider adopting key elements of the Norwegian field management strategy, including:

1. System of Requirements: Establishing comprehensive requirements for the development of plans that align with international best practices.

2. Independent QAE Examination: Implementing a system for independent Quality Assurance Expert Reviews to enhance the credibility and thoroughness of development plan assessments.
3. Transparent Decision-Making System: Creating a transparent decision-making framework that encourages stakeholder participation and accountability.
4. Transfer of Decision-Making Power: Empowering stakeholders and relevant authorities by transferring decision-making authority. This approach fosters a sense of ownership and responsibility among those affected by decisions, ultimately enhancing the effectiveness of management strategies.
5. Personnel Training: Investing in training programs to equip personnel with the necessary skills and knowledge to implement these strategies effectively.

By adopting these recommendations, Kazakhstan can improve its mineral resource management strategies, leading to better economic outcomes and increased stakeholder satisfaction. The insights gained from this comparative analysis can serve as a foundation for future research and policy development in the field of mineral resource management.



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