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JOINT VENTURES IN KAZAKHSTAN'S OIL AND GAS SECTOR: ECONOMIC BENEFITS, TECHNOLOGY TRANSFER, AND NATIONAL SECURITY RISKS

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Abstract. This article explores the dual impact of joint ventures in Kazakhstan's oil and gas sector, focusing on both economic efficiency and strategic risks. While such partnerships—particularly those involving Chinese companies—have contributed over US\$42 billion in investment over the past 25 years, leading to growth in GDP, exports, job creation, and modernization through technology transfer, they also present national security concerns. These include foreign dependency, regulatory uncertainty, and the potential loss of control over strategic natural resources. The article reviews ten academic studies using structured criteria, synthesizing findings across investment performance, partnership models, and risk categories. The analysis reveals that flexible investment mechanisms, such as production sharing agreements, are seen as effective in balancing investor interests with national priorities. Technology transfer emerges as a key benefit, supporting energy efficiency and innovation. However, risks linked to foreign control, sanctions, and geopolitical shifts remain high-impact challenges. The paper highlights the need for diversified international cooperation, robust regulatory frameworks, and long-term sustainability strategies. Findings suggest that Kazakhstan can benefit most from partnerships that prioritize knowledge sharing, transparency, and alignment with national development goals.

Keywords: Kazakhstan, oil and gas sector, joint ventures, foreign investment, technology transfer, national security, China, sustainable development.

Introduction

Joint ventures in Kazakhstan's oil and gas sector demonstrate a dual impact: positive economic and technological outcomes balanced against strategic risks to national energy security and resource control.

Joint ventures in Kazakhstan's oil and gas sector yield tangible economic benefits and generate notable technology gains. Chinese-led partnerships, for example, have delivered more than US\$42 billion in investments over 25 years, contributing to increased GDP, exports, job creation, and enhanced production capacity. Production sharing agreements and flexible investment mechanisms appear to optimize risk and profitability while fostering modernization and energy efficiency through technology transfer.

At the same time, papers report that such partnerships bring risks to national energy security. Evidence points to concerns over foreign dependency, regulatory uncertainty, and a potential loss of national control over strategic resources. Some analyses describe high-impact risks from foreign resource control and sanctions, with recommendations to diversify international ties, maintain state oversight, and adopt adaptive regulatory measures to balance these risks with economic benefits [1].

Materials and research methods

We analyzed 10 papers from an initial pool of 50, using 8 screening criteria. Each paper was reviewed for 5 key aspects that mattered most to the research question.

Research results

Key observations about the included studies:

- Research Focus:

The 10 studies we reviewed covered a diverse range of research focuses. Economic security was the most common focus, appearing in 2 studies. Other focuses included Chinese participation, strategic development, energy cooperation, oil law, economic efficiency, transaction processes, investment dynamics, attracting investors, industry problems, and foreign policy.

- Study Type:

Theoretical analysis was the most common study type, used in 5 studies. Comparative studies were used in 2 studies. Other study types included analytical, SWOT analysis, monographic, empirical, and general analysis, each used in 1 study.

- Geographic Scope:

Kazakhstan was the most frequent focus, appearing in 8 studies. Kazakhstan-China relations were specifically studied in 2 studies. Other countries mentioned included Turkmenistan, China, and the USA. We didn't find geographic information for 2 studies.

- Partnership Model:

We didn't find specific partnership model information for 6 out of 10 studies. Joint ventures and production sharing were each mentioned in 2 studies. Other models included investments, acquisitions, bond purchases, and investment partnerships. 1 study mentioned various partnership models without specifying.

Based on our review, many of the studies focused on Kazakhstan's oil and gas sector, with the papers reporting various research approaches and partnership models. There appears to be particular interest in economic aspects and international cooperation, especially with China. [2].

Economic Efficiency Analysis

Investment Performance

Key observations:

- Investment Volume:

We found specific investment volumes for 3 out of 10 studies. These included over \$42 billion over 25 years, 10,355 million tenge in 2022 for energy-saving technologies, and a government aim to attract over \$37 billion. We didn't find specific investment volumes for 9 out of 10 studies.

- Performance Metrics:

We found specific performance metrics for 4 out of 10 studies. These included contributions to GDP, exports, job creation, tax revenues; a decline in China's share of Kazakh oil production; energy savings with diminishing effect over time; and optimized risk and potential profitability. We didn't find specific performance metrics for 8 out of 10 studies. [3].

- Technology Benefits:

We found specific technology benefits for 5 out of 10 studies. These included infrastructure improvements, increased production capacity, modernization of industry, use of advanced technologies, energy-efficient technologies, innovative technologies for economic security, and innovative technologies for efficiency and cost reduction. We didn't find specific technology benefits for 7 out of 10 studies.

The studies varied widely in the specificity of information provided across these three categories, with technology benefits being the most frequently specified aspect.

National Security Implications

Key Observations:

A review of the selected studies revealed a wide variety of risk categories associated with joint ventures and the oil and gas sector in Kazakhstan. Among these, the most frequently mentioned was foreign dependency, which appeared in two studies. This risk is primarily linked to Kazakhstan's reliance on external technologies, investment capital, and strategic decision-making involving international partners. Other studies highlighted risks such as regulatory uncertainty, environmental constraints, and the influence of foreign control over critical infrastructure. Geopolitical risks were also noted, particularly those stemming from regional instability and international sanctions. In addition, concerns about market volatility, investment risks, and shifts in legislative frameworks

emerged across several analyses. Energy dependency, both in terms of imports and exports, was also considered a potential vulnerability. However, three of the studies reviewed did not specify any risk categories, making direct comparison more difficult [4].

In terms of the reported level of impact, high impact was the most frequently identified across the sample. Five studies classified the risks as having a significant and far-reaching effect on operations, national strategy, or investor behavior. Moderate levels of impact were reported in three studies, reflecting risks that are noteworthy but manageable under current conditions. One study offered a more nuanced assessment by suggesting that while some risks may appear minimal in the short term, their long-term consequences could be far more severe. This temporal distinction highlights the importance of strategic foresight in evaluating sectoral vulnerabilities. Conversely, three studies did not provide any clear assessment of impact levels, leaving a gap in the overall analysis.

Regarding mitigation measures, the studies revealed a range of strategies aimed at reducing exposure to the identified risks. The most commonly cited approaches included the adoption of innovative technologies and the development of adaptable operational models, both of which were discussed in two studies each. Additional strategies referenced included diversification of markets and supply chains, strengthening of national control over key assets, and fostering international cooperation. A shift toward international standards and flexible investment mechanisms was also seen as a way to align Kazakhstan's energy sector with global best practices. In several cases, energy-saving initiatives and the search for alternative markets were proposed as essential tools for building long-term resilience. Nonetheless, mitigation strategies were either not addressed or only briefly mentioned in three studies, limiting the depth of insight into practical responses [5].

The strategic implications of these findings were diverse and context-specific. Energy and economic security emerged as the most prominent themes, each mentioned in two studies. These concerns underscore Kazakhstan's broader strategic objective of maintaining sovereignty over its natural resources while ensuring stable economic development. Several studies also discussed how joint ventures in the energy sector could stimulate economic growth and support industrial modernization through the introduction of advanced technologies and practices. Changes in geopolitical dynamics were highlighted, suggesting that Kazakhstan's approach to international partnerships may influence its regional and global positioning. Additional implications included improved investment attractiveness, particularly through alignment with environmental, social, and governance (ESG) standards, and the contribution of these developments to the United Nations Sustainable Development Goals (SDGs). Some studies raised concerns about long-term investment challenges, including regulatory unpredictability and infrastructure limitations. Moreover, while efforts to balance risk and return were observed in investor strategies, certain systemic barriers to sustainable development remained unaddressed. Overall, the reviewed studies suggest that the oil and gas sector, particularly through joint ventures, plays a critical role not only in Kazakhstan's economic framework but also in shaping its foreign policy and sustainable development trajectory [6].

Synthesis of Findings

Partnership Model Effectiveness

The studies we reviewed reported varying levels of effectiveness for different partnership models in Kazakhstan's oil and gas sector. Key findings include:

Joint ventures, especially those involving Chinese companies, have been shown to generate considerable economic benefits for Kazakhstan. According to Han and Adambekova (2023), these partnerships have made notable contributions to the country's gross domestic product (GDP), export growth, and employment creation. Their analysis suggests that such joint ventures not only bring in foreign capital but also stimulate domestic economic activity by integrating Kazakhstan more deeply into regional value chains and global energy markets [7].

However, the dynamics of these partnerships appear to be shifting. Rohan (2023) observed a gradual decline in the share of Kazakh oil production attributed to Chinese enterprises. This trend may reflect evolving geopolitical considerations, diversification of foreign partners, or changes in

Kazakhstan's national investment strategy. The data presented indicate a complex and potentially transitional phase in the country's cooperation with Chinese stakeholders in the energy sector.

The structure of investment mechanisms also plays a significant role in shaping the outcomes of joint ventures. In their 2024 study, Safiullin and Faiz highlighted the advantages of production sharing agreements and other flexible investment frameworks. These mechanisms are designed to distribute risk and reward more equitably between domestic and foreign partners, thereby enhancing investor confidence while ensuring that national interests are preserved. Their findings suggest that such models can serve as effective tools for balancing profitability with long-term strategic objectives.

Furthermore, the success of joint ventures in Kazakhstan's oil and gas sector appears to be strongly correlated with the degree of technology transfer and innovation achieved through collaboration.

Risk-Benefit Balance

The studies revealed various perspectives on the balance between economic benefits of international partnerships and risks to national energy security:

Foreign investment in Kazakhstan's oil and gas sector has been widely acknowledged for its economic advantages, particularly in terms of capital inflow, technological development, and export expansion. However, alongside these benefits, concerns persist regarding the implications of foreign involvement for national sovereignty. Specifically, issues such as foreign dependency and the transfer of control over strategic natural resources have been raised in several studies. Velyaminov (2009), for instance, strongly underscored the importance of preserving national ownership and control over oil and gas assets. His work reflects a cautious stance toward foreign participation, warning that excessive reliance on international partners could undermine the country's ability to independently manage its energy resources.

In a more contemporary context, Osmanov et al. (2024) examined the evolving geopolitical landscape and its implications for Kazakhstan. Their analysis suggests that while immediate risks associated with international developments—such as the imposition of economic sanctions—may currently be limited, longer-term challenges remain. These include shifting global alliances, changing trade routes, and increasing competition in international energy markets, all of which could impact Kazakhstan's strategic positioning.

The overall balance between risks and benefits appears to be shaped by broader global factors. Among these are geopolitical tensions, market volatility, and rising environmental pressures—all of which influence investor behavior, regulatory approaches, and long-term planning. In light of these challenges, Suleimanova et al. (2024) emphasize the importance of adaptability. They advocate for flexible partnership models that allow for responsiveness to changing external conditions, arguing that such models are better positioned to maintain a favorable balance between risk exposure and economic gain. According to their findings, flexibility in institutional arrangements and strategic decision-making can be a critical factor in ensuring the long-term resilience and sustainability of foreign engagement in Kazakhstan's energy sector.

Key Themes from Synthesis of Findings

A number of studies emphasize the strategic importance of diversifying Kazakhstan's international partnerships within the oil and gas sector. Rather than relying heavily on a limited number of foreign partners, scholars argue for a broader network of cooperation to mitigate risks stemming from political shifts, economic sanctions, or imbalances in bargaining power. This approach is seen as a safeguard against external shocks and a pathway to greater geopolitical and economic resilience.

Another recurring theme in the literature is the critical role of technology transfer in partnership models. Many studies highlight that the most beneficial joint ventures are those that facilitate the flow of advanced technologies, managerial expertise, and innovative practices into Kazakhstan's energy industry. This, in turn, is expected to improve the long-term efficiency, competitiveness, and modernization of the sector, positioning the country more effectively in global energy markets.

Closely tied to this is the need for an adaptive and responsive regulatory framework. Several papers argue that Kazakhstan's institutional environment should maintain a balance between protecting national interests and being flexible enough to accommodate rapidly evolving global market conditions. Such a framework would ideally allow for quicker responses to economic volatility, environmental shifts, and technological changes, while still ensuring oversight and accountability.

The importance of sustainability is also growing in policy and academic discussions. Yelemesov et al. (2024) emphasize that consistent investment in energy-saving and environmentally friendly technologies is not only aligned with global trends but also essential for enhancing long-term environmental and economic sustainability. These technologies are increasingly viewed as critical to Kazakhstan's transition toward a more resilient and diversified energy portfolio.

Transparency and alignment with international standards are further highlighted as crucial to improving the country's investment climate. Kadirov (2024) suggests that adopting global financial and operational reporting frameworks can increase investor confidence, reduce information asymmetries, and facilitate more productive and reliable partnerships.

In parallel, the literature continues to emphasize the importance of maintaining a degree of national control over strategic resources. Velyaminov (2009), in particular, argues that while foreign partnerships can bring substantial economic and technological gains, they must be carefully structured to avoid the loss of sovereignty or control over vital assets. His position advocates for a hybrid model—leveraging international expertise and capital while ensuring that key decisions remain under national jurisdiction [8].

Finally, a broader vision of economic transformation is offered by Tumanshiyev and Isova (2024), who propose economic diversification as a means of reducing Kazakhstan's dependence on the oil and gas sector. By developing other sectors of the economy, the country can enhance its resilience to energy market fluctuations, generate new employment opportunities, and support sustainable long-term growth.

Conclusion

The reviewed body of research reveals a complex but insightful picture of joint ventures in Kazakhstan's oil and gas sector, highlighting a dynamic interplay between economic benefits, technological advancement, and national security concerns. While foreign partnerships, especially those involving China, have led to significant capital inflows, job creation, and technology transfer, they simultaneously raise questions about foreign dependency, strategic autonomy, and long-term sustainability.

The studies show that joint ventures have indeed contributed to the modernization of Kazakhstan's oil and gas infrastructure, facilitated access to energy-efficient and innovative technologies, and played a significant role in GDP growth and export expansion. Particularly, Chinese investments exceeding US\$42 billion over 25 years underscore the scale of such partnerships. Production sharing agreements and flexible investment mechanisms have proven effective in balancing investor interests with national goals, especially in risk-intensive projects [9].

However, a recurring theme across multiple studies is the tension between economic gains and the strategic risks associated with foreign involvement. Concerns over regulatory uncertainty, sanctions, market instability, and environmental constraints underline the importance of a robust and adaptive national policy framework. High-impact risks related to foreign control over strategic resources necessitate careful oversight and the development of counterbalancing mechanisms.

To mitigate these risks while preserving the benefits of international cooperation, several strategies emerge. These include diversification of international partners, prioritization of technology transfer, implementation of flexible and responsive regulatory policies, and continued investment in sustainable, energy-efficient technologies. Additionally, maintaining a degree of national control over strategic assets, transitioning to international reporting standards, and fostering transparency are essential for long-term resilience.

An important implication of this research is the recognition that not all partnership models yield the same outcomes. Joint ventures appear more effective when they are structured around

knowledge and technology sharing, rather than merely resource access. The studies also suggest that Kazakhstan's ability to respond to shifting global dynamics—be they geopolitical or environmental—will largely determine the future success of these partnerships [10].

In sum, joint ventures in Kazakhstan's oil and gas sector have the potential to serve as engines of economic growth and innovation. However, to fully realize this potential, it is crucial to align partnership models with national strategic priorities, ensure regulatory adaptability, and pursue a balanced approach that considers both immediate benefits and long-term risks. The findings emphasize the value of smart, diversified, and well-regulated partnerships that contribute not only to economic efficiency but also to national sovereignty and sustainable development.

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ҚАЗАҚСТАННЫҢ МҰНАЙ-ГАЗ СЕКТОРЫНДАҒЫ БІРЛЕСКЕН КӘСІПОРЫНДАР: ЭКОНОМИКАЛЫҚ ПАЙДА, ТЕХНОЛОГИЯ ТРАНСФЕРІ ЖӘНЕ ҰЛТТЫҚ ҚАУІПСІЗДІК ТӘУЕКЕЛДЕРІ

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Аннотация. Бұл мақалада Қазақстанның мұнай-газ секторындағы бірлескен кәсіпорындардың екі жақты әсері — экономикалық тиімділік пен ұлттық қауіпсіздікке төнетін стратегиялық тәуекелдер қарастырылады. Әсіресе Қытаймен серіктестікте жүзеге асқан жобалар соңғы 25 жылда 42 млрд АҚШ долларынан астам инвестиция тартуға ықпал етіп, ЖІӨ өсуіне, экспортқа, жұмыс орындарының құрылуына және технологияларды енгізу арқылы саланы жаңғыртуға мүмкіндік берді. Алайда мұндай серіктестіктер шетелге тәуелділік, реттеудегі белгісіздік және стратегиялық ресурстарға бақылаудан айырылу сияқты қауіптерді де арттырады. Зерттеу 10 ғылыми мақаланы құрылымдық критерийлер негізінде талдап, инвестициялық тиімділік, әріптестік модельдері мен қауіптерді жүйелейді. Нәтижелер икемді инвестициялық тетіктердің, соның ішінде өнімді бөлу келісімдерінің, тиімділігін және технологиялық трансфердің маңыздылығын көрсетеді. Сонымен қатар санкциялар, геосаяси өзгерістер және инфрақұрылымға шетелдік бақылау сияқты қауіптер жоғары деңгейлі болып есептеледі. Ұсынылған шешімдер қатарына халықаралық әріптестікті әртараптандыру, ұлттық бақылауды күшейту және тұрақты даму стратегиясын іске асыру жатады. Білім мен технология алмасуға негізделген серіктестік үлгілері анағұрлым тиімді деп танылды.

Түйін сөздер: Қазақстан, мұнай-газ секторы, бірлескен кәсіпорындар, шетелдік инвестициялар, технология трансфері, ұлттық қауіпсіздік, Қытай, тұрақты даму.

СОВМЕСТНЫЕ ПРЕДПРИЯТИЯ В НЕФТЕГАЗОВОМ СЕКТОРЕ КАЗАХСТАНА: ЭКОНОМИЧЕСКИЕ ВЫГОДЫ, ТРАНСФЕР ТЕХНОЛОГИЙ И РИСКИ НАЦИОНАЛЬНОЙ БЕЗОПАСНОСТИ

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Аннотация. В статье рассматривается влияние совместных предприятий в нефтегазовом секторе Казахстана с акцентом как на экономическую эффективность, так и на стратегические риски. Совместные проекты, особенно с участием китайских компаний, за последние 25 лет обеспечили свыше 42 млрд долларов инвестиций, что способствовало росту ВВП, экспорта, созданию рабочих мест и модернизации отрасли через трансфер технологий. Однако наряду с этим усиливаются риски, связанные с зависимостью от иностранных партнеров, неопределенностью регулирования и утратой контроля над стратегическими ресурсами. Статья обобщает результаты десяти научных публикаций, анализируя инвестиционные показатели, модели партнерства и категории рисков. Выводы подчеркивают важность гибких механизмов инвестирования, таких как соглашения о разделе продукции, а также значимость передачи технологий для устойчивого развития. Среди рисков особо

выделяются санкции, геополитическая нестабильность и контроль над инфраструктурой. В статье предлагаются меры по диверсификации международных связей, усилению государственного контроля и адаптации нормативно-правовой базы. Оптимальными признаются модели партнерства, ориентированные на обмен знаниями и соответствие национальным целям.

Ключевые слова: Казахстан, нефтегазовый сектор, совместные предприятия, иностранные инвестиции, передача технологий, национальная безопасность, Китай, устойчивое развитие.