

D. Jiang^{1*} , B. Mukhamediyev² 

Al-Farabi Kazakh National University, Almaty, Kazakhstan

*e-mail: jiangdekun0909@gmail.com

STRATEGIC HRM, EMPLOYEE MOTIVATION, AND INNOVATION IN CHINESE OIL & GAS SOES: EVIDENCE FROM THE KAZAKHSTAN-CHINA PIPELINE

This study examines how human resource management (HRM) practices influence the innovation performance of Chinese state-owned enterprises (SOEs) working on Belt and Road energy projects. The Kazakhstan-China pipeline project is used as the central case. To understand how HRM operates in this setting, the study draws on survey responses from 50 employees together with interviews with HR managers and senior executives.

The findings indicate that HRM practices tend to work better when they are adjusted to local realities rather than transferred directly from headquarters. Once moved into a different cultural and institutional environment, standard procedures often lose some of their force. In contrast, measures shaped with local needs in mind—such as clearer job stability, performance rewards that employees consider reasonable, and workplace norms that fit local expectations—were more effective in raising motivation.

Higher motivation was reflected in steadier daily operations, more reliable work processes, and healthier financial outcomes. These patterns suggest a pathway in which improvements in HRM help build motivation and, in turn, strengthen the conditions needed for innovation. The findings also show that cultural distance, institutional rules, and the physical conditions of fieldwork influence how HRM initiatives are received and carried out. In practice, this makes flexible management, consistent communication, and well-targeted support especially important.

For Chinese SOEs expanding abroad, the results provide practical guidance for designing incentive systems and improving innovation performance in overseas energy projects. The study also points out that assessments of Belt and Road projects should pay closer attention to people-related and cross-cultural factors, rather than focusing only on technical or financial results. Because this analysis is based on a single case and relies on indirect measures of innovation, the conclusions should be interpreted with caution. Future research could compare additional cases and use more direct indicators, such as patent activity or recorded process improvements.

Keywords: HRM, employee motivation, innovation performance, international management, Oil and Gas Industry.

Д. Цзян*, Б. Мұхамедиев

Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан

*e-mail: jiangdekun0909@gmail.com

Қытайдың мемлекеттік мұнай-газ кәсіпорындарындағы стратегиялық адам ресурстарын басқару, қызметкерлер мотивациясы және инновациялар: Kazakhstan–China Pipeline мысалында

Бұл зерттеу Қытайдың мемлекеттік кәсіпорындарының интернационалдануы барысында адам ресурстарын басқару (HRM) тәжірибелерінің қызметкерлер мотивациясына әсерін талдайды. Негізгі зерттеу нысаны ретінде Қазақстан–Қытай мұнай-газ құбыры жобасы таңдалып, ол трансшекаралық энергетикалық ынтымақтастықтың типтік үлгісі ретінде қарастырылады. HRM жүйесінің осы жағдайда қалай жұмыс істейтінін түсіну үшін аралас зерттеу әдісі қолданылды: 50 қызметкер арасында сауалнама жүргізіліп, сонымен қатар HR менеджерлері мен жоғары деңгейдегі басшылармен сұхбаттар өткізілді.

Зерттеу нәтижелері көрсеткендей, адам ресурстарын басқару тәжірибелері штаб-пәтерден тікелей көшірілген жағдайда емес, жергілікті жағдайларға бейімделген кезде анағұрлым тиімді болады. Өртүрлі мәдени және институционалдық ортада стандартталған басқару тәсілдері өз тиімділігін жиі жоғалтады. Ал жергілікті ерекшеліктерді ескеретін шаралар – жұмыспен қамтылудың тұрақтылығын нақты түсіндіру, әділ қабылданатын марапаттау жүйелері және жұмыс орнының жергілікті күтулерге сәйкес нормалары – қызметкерлердің мотивациясын арттыруға көбірек ықпал етеді.

Мотивация деңгейінің жоғарылауы күнделікті операциялардың тұрақтылығының артуынан, жұмыс процестерінің сенімділігінің жақсаруынан және қаржылық нәтижелердің өсуінен байқалады. Бұл үрдістер HRM тәжірибелерін жетілдіру қызметкерлер мотивациясын күшейтіп, өз кезегінде операциялық тиімділікті арттыратынын көрсетеді. Осы зерттеуде мұндай өзгерістер тікелей инновациялық көрсеткіштерді өлшеу қиын болатын жағдайда процестік жетілдірулерді сипаттайтын инновациялық тиімділіктің көрсеткіштері ретінде қарастырылады.

Сонымен қатар зерттеу мәдени айырмашылықтар, институционалдық шектеулер және өндірістік жағдайлар халықаралық жобаларда HRM тәжірибелерін енгізу мен қабылдауға елеулі әсер ететінін анықтады. Сондықтан тәжірибеде икемді басқару, тұрақты коммуникация және мақсатты қолдау шаралары ерекше маңызды болып табылады.

Интернационалдану кезеңінен өтіп жатқан Қытайдың мемлекеттік кәсіпорындары үшін бұл зерттеу шетелдік энергетикалық жобалардағы ынталандыру жүйелерін жетілдіруге және операциялық тиімділікті арттыруға арналған практикалық ұсыныстар береді. Зерттеу HRM тәжірибелерін жергілікті жағдайларға бейімдеудің халықаралық табыс үшін маңызды екенін көрсетеді. Сондай-ақ «Бір белдеу, бір жол» жобаларын бағалау кезінде тек техникалық немесе қаржылық нәтижелерге емес, адами және мәдениетаралық факторларға да көбірек көңіл бөлу қажеттігін атап өтеді.

Зерттеу бір ғана жағдайлық талдауға негізделген және инновациялық тиімділіктің жанама көрсеткіштерін қолданатындықтан, алынған қорытындыларды сақтықпен түсіндіру қажет. Болашақ зерттеулер бірнеше жобаны салыстырып, патенттік белсенділік немесе нақты тіркелген процестік жетілдірулер сияқты тікелей көрсеткіштерді пайдалана алады.

Түйін сөздер: адам ресурстарын басқару, қызметкерлер мотивациясы, инновациялық тиімділік, интернационалдану, мемлекеттік кәсіпорындар.

Д. Цзян*, Б. Мухамедиев

Казахский национальный университет им. аль-Фараби, Алматы, Казахстан

*e-mail: jiangdekun0909@gmail.com

Стратегическое управление человеческими ресурсами, мотивация сотрудников и инновации в китайских государственных нефтегазовых предприятиях: на примере Kazakhstan-China Pipeline

Данное исследование рассматривает влияние практик управления человеческими ресурсами (HRM) на мотивацию сотрудников в процессе интернационализации китайских государственных предприятий. В качестве основного кейса выбран казахстанско-китайский трубопроводный проект, представляющий собой типичный пример трансграничного энергетического сотрудничества. Для анализа функционирования HRM в данных условиях использован смешанный метод исследования, включающий анкетирование 50 сотрудников, а также интервью с HR-менеджерами и руководителями высшего звена.

Результаты показывают, что практики управления персоналом оказываются более эффективными, когда они адаптированы к местным условиям, а не напрямую перенесены из головного офиса. В различных культурных и институциональных средах стандартизированные подходы часто теряют свою эффективность. Напротив, меры, учитывающие локальные особенности – такие как более высокая ясность в вопросах стабильности занятости, справедливо воспринимаемые системы вознаграждения и организационные нормы, соответствующие местным ожиданиям – способствуют повышению мотивации сотрудников.

Рост мотивации проявляется в большей стабильности ежедневных операций, повышении надежности рабочих процессов и улучшении финансовых результатов. Полученные данные указывают на взаимосвязь, при которой совершенствование HRM усиливает мотивацию сотрудников и, как следствие, повышает операционную эффективность. В рамках данного исследования такие улучшения интерпретируются как показатели инновационной эффективности, отражающие процессные улучшения в условиях, когда прямые показатели инноваций трудно измерить.

Исследование также показывает, что культурная дистанция, институциональные ограничения и производственные условия существенно влияют на внедрение и восприятие HRM-практик в международной деятельности. В практическом плане это делает особенно важными гибкое управление, последовательную коммуникацию и адресную поддержку сотрудников.

Для китайских государственных предприятий, проходящих этап интернационализации, результаты исследования предлагают практические рекомендации по разработке систем стимулирования и повышению эффективности зарубежных энергетических проектов. Работа подчеркивает важность локализации HRM для успешного международного развития. Кроме того, исследование показывает, что оценка проектов инициативы «Один пояс – один путь» должна

уделять больше внимания человеческим и межкультурным факторам, а не ограничиваться исключительно техническими или финансовыми показателями.

Поскольку анализ основан на одном кейсе и использует косвенные показатели инновационной эффективности, полученные выводы следует интерпретировать с осторожностью. Будущие исследования могут включать сравнительный анализ нескольких проектов и применять более прямые индикаторы, такие как патентная активность или документально подтвержденные процессные улучшения.

Ключевые слова: управление человеческими ресурсами, мотивация сотрудников, инновационная эффективность, интернационализация, государственные предприятия.

Introduction

HRM is widely recognized as an important factor affecting organizational performance, especially in industries subject to geopolitical risks, economic volatility and operational pressures. The oil and gas industry is particularly dependent on an effective HRM system due to its high capital intensity, specialized skill requirements and complex multinational operating environment. For Chinese SOEs participating in the Belt and Road Initiative, how to motivate employees, maintain organizational vitality and continuously promote technological and management innovation in overseas projects has become a key issue affecting their competitiveness.

Large-scale energy cooperation projects in Kazakhstan and other Belt and Road countries, such as the Kazakhstan-China Pipeline LLP, operate in a highly diverse and ever-changing environment. The local legal system, labor norms, cultural differences, and geopolitical sensitivities may all affect companies' HRM practices. For Chinese SOEs, this means not only allocating labor under different institutional environments, but also creating effective incentives in a cross-cultural context to ensure that employees remain continuously motivated and innovative. In overseas environments, these challenges have placed significant adaptive pressure on the traditional SOE management model, which is primarily characterized by stability and administrative control.

Existing research has pointed out that overly centralized administrative structures may limit organizational flexibility and weaken employee initiative and innovative behavior (Björkman & Lervik, 2007; Ferner et al., 2012). The management characteristics of SOEs that emphasize stability may also reduce employees' work engagement and innovation motivation (Bowen & Ostroff, 2004; Cooke, 2018). Although the relationship between HRM and SOE performance has been extensively discussed, it is only within the domestic context. Existing research remains relatively limited on how Chinese

SOEs should adapt their HRM practices in multinational operational contexts and how to maintain employee motivation and innovation capabilities amid institutional differences and cultural distances. In particular, there is a lack of empirical evidence in a highly strategic, politically and technically demanding industry such as energy cooperation projects.

Based on this, Kazakhstan-Chinese Pipeline LLP, which has operated in Kazakhstan for many years, is taken as a case study in this research. This study systematically analyzes how core HRM practices such as recruitment, training, performance management, and employee engagement affect employee motivation and further explores the relationship between employee motivation and innovation performance. The study also focuses on how cross-cultural management, geopolitical factors, and SOE governance characteristics combine to shape the effectiveness of HRM practices.

This study contributes to the literature by examining the relationship between strategic HRM, employee motivation, and innovation-related performance in a cross-border Chinese state-owned energy enterprise operating under the Belt and Road Initiative, where empirical evidence remains limited. Unlike previous studies that mainly examine domestic SOEs or private multinational firms, the findings suggest that localized HRM practices are more effective than directly transferring headquarters' standardized HRM systems in motivating employees and supporting innovation-related performance.

The study further finds that employee motivation functions as an important mechanism linking HRM practices with innovation-related performance. The analysis shows that improvements in HRM practices enhance employee motivation, which is associated with better operational and financial outcomes related to innovation performance. The findings further indicate that, in large-scale energy infrastructure projects where conventional innovation indicators are difficult to obtain, operational and financial indicators can serve as meaningful proxies for innovation-related performance.

Finally, the findings demonstrate that institutional differences, cultural distance, and cross-border operating conditions shape the effectiveness of HRM practices in overseas Chinese SOEs. By integrating survey evidence with qualitative interviews, this study provides a more comprehensive understanding of these relationships. These findings contribute to the growing literature on international HRM in Chinese state-owned enterprises and provide practical guidance for improving HRM practices, enhancing employee motivation, and supporting innovation performance in overseas energy projects.

Literature review

Chinese SOEs began expanding overseas during the 1990s. Early overseas activities focused mainly on resources, including oil, gas, mining, and infrastructure projects in politically aligned countries (Cooke et al., 2018). The Belt and Road Initiative accelerated this process and increased Chinese investment across Central Asia, where many projects involve long-term cooperation between Chinese and local state-owned companies. Chinese SOEs also carry a distinctive management structure characterised by formal administrative procedures, centralised reporting systems, and political accountability. These features shape the management of overseas subsidiaries, particularly in HRM practices. Existing research suggests that multinational enterprises often face a tension between replicating home-country HRM systems and adapting them to host-country conditions, with the balance between global integration and local adaptation shaped by institutional and firm-specific factors (Cooke et al., 2018; Patel et al., 2024). Existing research shows that strategic HRM practices, including selection, training, appraisal, rewards, and employee empowerment, can strengthen organizational capabilities and contribute to innovation and firm performance (Chawla et al., 2023). Recent evidence further shows that a strategic HR focus can promote firm innovation through high-performance work systems, with the strength of this relationship varying across state-owned and privately owned enterprises (Wang et al., 2024). Prior studies report that clear communication, fair evaluation and supportive work environments improve employees' willingness to contribute (Díaz-Fernández et al., 2023; Saad et al., 2021). Motivation also increases when HRM reflects organizational values, including environmental and social responsibility (Bowen & Ostroff, 2004; Jiang et al., 2012). Recent evidence from the Chinese context further sug-

gests that culturally embedded HRM practices can influence employee innovative behavior, although their effects depend partly on how employees perceive and respond to these practices (Ren et al., 2024). This contextual perspective is also consistent with the AMO framework, which emphasizes that employees' abilities, motivation and opportunities shape work behaviour (Lepak et al., 2006; Van Berkel et al., 2022).

At the same time, many studies show that motivation supports innovation. Employees are more likely to develop or adopt new ideas when they have autonomy, positive emotions, supportive leadership and influence over decisions (Shipton et al., 2006; Muñoz-Pascual et al., 2021). Flexible work arrangements can support employees' adaptability and innovation (Azeem & Kotey, 2023). More broadly, strategic HR practices involving recruitment, training, development, and performance management have also been associated with stronger innovation performance (Trivedi & Srivastava, 2024). Together, these findings suggest that motivation is a key mechanism linking HRM to innovation.

International HRM research has long debated whether multinational firms should standardise HRM systems or adapt them locally (Ferner et al., 2012). Standardisation supports organisational control and consistency across subsidiaries, while local adaptation improves acceptance and effectiveness in the host-country environment. Several studies on Chinese multinational enterprises report a similar pattern. Formal personnel systems are often implemented relatively quickly because they support organisational control and reporting consistency across subsidiaries. Participative and informal practices, however, tend to develop more slowly and unevenly. Cooke et al. (2018) argue that Chinese SOEs often establish formal compliance systems first, while relational HRM practices receive less attention during the early stages of internationalisation. More recent evidence also suggests that the configuration of HRM systems matters for innovation in international settings, as commitment and collaboration-based HRM systems can support different forms of innovation among firms operating across national boundaries (Menzies et al., 2025).

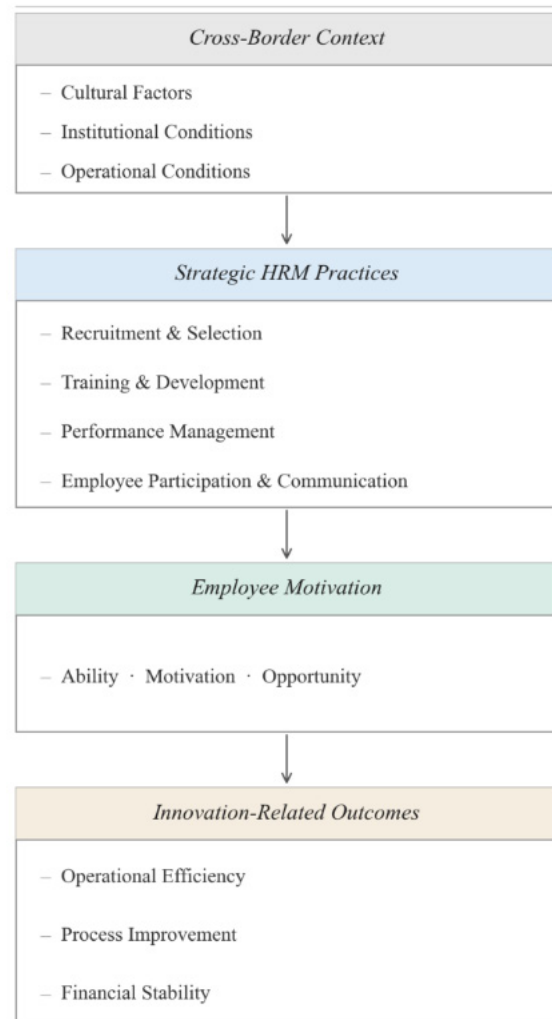
Not all HRM practices transfer equally across borders. Formal HRM systems, such as written job descriptions, structured training programmes, appraisal procedures, and rule-based compensation mechanisms, are relatively easier to standardise because they can be documented and monitored centrally. Relational HRM practices, including commu-

nication quality, employee participation, fairness, and managerial support, are more difficult to transfer because they depend heavily on local management behaviour and workplace expectations (Björkman & Lervik, 2007; Farndale & Paauwe, 2007). However, most of this evidence comes from private firms or domestic public organizations, while research on cross-border state-owned enterprises remains limited. Institutional differences between home and host countries can shape the extent to which multinational headquarters control subsidiary HRM policies and influence how HRM practices are implemented across borders (Fenton-O'Creevy & Gooderham, 2025). Political embeddedness may also affect innovation outcomes in the international activities of Chinese firms, highlighting the importance of the broader institutional and political environment in cross-border operations (Liang et al., 2025). Leadership adaptation and localized HRM are therefore important for maintaining employee motivation and supporting innovation in bureaucratic and multicultural settings (Indrayanti et al., 2025). Despite these insights, few studies examine HRM, motivation and innovation together in one integrated framework. Even fewer incorporate cross-border conditions directly into this relationship. This gap is particularly important for Chinese SOEs in the high-risk energy sector that operate internationally. Such enterprises have a strong demand for innovation, yet their operational improvement processes are difficult to observe directly through publicly available research and development (R&D) data.

To address this gap, the present study adopts a conceptual framework (Figure 1) that treats employee motivation as the main link between strategic HRM practices and innovation-related outcomes.

HRM practices—including recruitment, training, performance management and engagement—are expected to strengthen employees' willingness and ability to contribute. Higher employee motivation contributes to improved operational efficiency and financial performance, and these metrics can be used as proxy variables to measure innovation in an energy industry with opaque data. In addition, the framework recognizes the cross-border environment as an essential contextual factor. It emphasizes that institutional, political, and cultural conditions affect HRM practices and, in turn, the effectiveness with which those practices translate into employee motivation and innovation. Based on this framework, the study addresses three research questions:

Figure 1
HRM-Motivation-Innovation Framework for Cross-Border SOEs



Note: Compiled by the authors based on the literature review

RQ1: How do strategic HRM practices relate to employee motivation in a cross-border SOE?

RQ2: How is employee motivation associated with innovation performance, using operational and financial indicators?

RQ3: How does the cross-border environment influence the relationships between HRM, motivation and innovation?

Methodology

This study uses a mixed-methods design to explore how HRM practices shape employee motiva-

tion and innovation-related outcomes in a cross-border organization. Most of the evidence comes from the survey, but it became clear early in the project that numbers alone would not capture how management practices actually work on the ground. People in overseas SOEs deal with cultural expectations, local regulations and organizational routines that are not easy to quantify. Because of this, interviews were added to help make sense of the survey patterns and provide a view of the context in which employees and managers operate.

The quantitative part of this study was based on a questionnaire survey conducted in March 2024 among employees of Kazakhstan-China Pipeline LLP. Given the case-study design of this research, a purposive sampling strategy was adopted to select employees who had direct experience of the company's HRM practices and organizational operations. A total of 50 valid questionnaires were collected from employees in the operations, engineering, and administrative departments, which represent the company's core functional areas and provide diverse perspectives on the implementation of HRM practices in a cross-border organizational setting. Due to the unique nature of cross-border oil and gas operations, purposive sampling was considered appropriate because it ensured that respondents possess relevant knowledge and practical experience. Although the sample size was relatively small ($n = 50$), the objective of this study was to obtain in-depth evidence from a specific organizational context rather than to achieve statistical generalization.

As shown in Table 1, the respondents represented different age groups, levels of work experience, organizational tenure, departments, and organizational positions, reflecting the diversity of the workforce within the company. This diversity enabled the study to capture perspectives from employees across multiple functional areas and different stages of their careers.

The questionnaire asked about four commonly discussed HRM practices: recruitment, training, performance management and employee engagement. A five-point Likert scale was used. Before running the analyses, the measurement items were checked. Reliability was high across all four dimensions, and the KMO and Bartlett tests indicated that the data were appropriate for factor analysis. Principal component analysis was used to explore how satisfaction items grouped together, and one-way ANOVA was conducted to compare satisfaction levels before and after the HRM adjustments. All survey participation was voluntary.

Table 1*Demographic Characteristics of the Respondents (N = 50)*

Variable	Category	n	%
Gender	Male	30	60
	Female	20	40
Age	20–35 years	27	54
	35–50 years	18	36
	Above 50 years	5	10
Work Experience	1–10 years	25	50
	10–20 years	15	30
	More than 20 years	10	20
Tenure at Current Company	1–3 years	22	44
	3–5 years	15	30
	More than 5 years	13	26
Position	Non-managerial employees	33	66
	Supervisory staff	11	22
	Middle and senior management	6	12
Department	Operations	23	46
	Engineering	16	32
	Administration	11	22

Note: Compiled by the authors based on survey data

To complement the survey results, semi-structured interviews were arranged with two HR managers and two senior managers who regularly deal with cross-border management issues. These were individuals who understand the daily pressures and practical limitations of working in an overseas SOE. The interviews focused on how cultural differences are handled, how institutional rules shape HRM practices, and how incentive systems function in practice. After transcription, the interviews were reviewed and coded thematically. The themes are not treated as statistical findings but are used to clarify and enrich the interpretation of the survey results.

This study circumvents the challenge of directly measuring innovation outcomes in the energy sector, where R&D data are seldom public, by using operational and financial indicators as indirect measures. Three indicators were examined over the period 2018–2024: capacity utilization, asset-liability ratio and the interest-bearing debt ratio. Although these do not measure innovation in a strict sense, they do reflect improvements in efficiency, financial stability and operational effectiveness, all of which are typically associated with innovation-related processes in this industry.

In large-scale energy infrastructure projects, conventional innovation outputs, such as patents or R&D outputs, are often unavailable or do not adequately capture process-oriented improvements. Therefore, innovation-related performance in this context is more likely to be reflected through process improvements. Higher capacity utilization may indicate more efficient resource utilization and operational efficiency, while lower asset-liability and interest-bearing debt ratios may reflect improved financial stability associated with these process improvements. These operational and financial indicators can serve as indirect proxies for innovation-related performance in situations where direct innovation measures are unavailable.

In the final stage of analysis, the quantitative and qualitative materials were brought together to develop a more grounded interpretation of the findings. The survey identified the patterns and direction of change, while the interviews helped explain why those changes might occur and how they are linked to the realities of managing a cross-border SOE.

Results and discussion

Changes in satisfaction before and after HRM practice adjustment

This study measured employee satisfaction before and after the implementation of HRM optimization initiatives in March 2024 in four areas: recruitment, training, performance management, and employee engagement. Tables 2 and 3 provide the detailed distributions.

As shown in Table 2, recruitment registered the highest level of dissatisfaction, with 55.69% of employees selecting “very dissatisfied” or “dissatisfied.” Training followed with 48.11% dissatisfaction. Performance management recorded a higher level of satisfaction, with 64.55% of responses falling in the “satisfied” or “very satisfied” categories. Employee engagement displayed a wide distribution, with 44.30% reporting dissatisfaction and 40.51% reporting satisfaction.

Table 2

Employee satisfaction with HRM practices before optimization

HRM practice	Very dissatisfied (%)	Dissatisfied (%)	Neutral (%)	Satisfied (%)	Very satisfied (%)
Recruitment	29.11	26.58	5.06	37.97	1.27
Training	16.46	31.65	6.33	43.04	2.53
Performance Management	12.66	18.99	3.80	56.96	7.59
Employee Engagement	6.33	37.97	5.06	10.13	40.51

Note: The table presents employee satisfaction levels before HRM optimization. Dissatisfaction is calculated as the sum of the first two categories, while satisfaction is calculated as the sum of the last two categories. Compiled by the authors based on the survey data

Table 3

Employee satisfaction with HRM practices after optimization

HRM practice	Very dissatisfied (%)	Dissatisfied (%)	Neutral (%)	Satisfied (%)	Very satisfied (%)
Recruitment	6.33	5.06	7.59	49.37	31.65
Training	5.06	5.06	6.33	39.24	44.30
Performance Management	6.33	1.27	7.59	45.57	39.24
Employee Engagement	10.13	6.33	5.06	37.97	40.51

Note: Compiled by the authors based on survey data

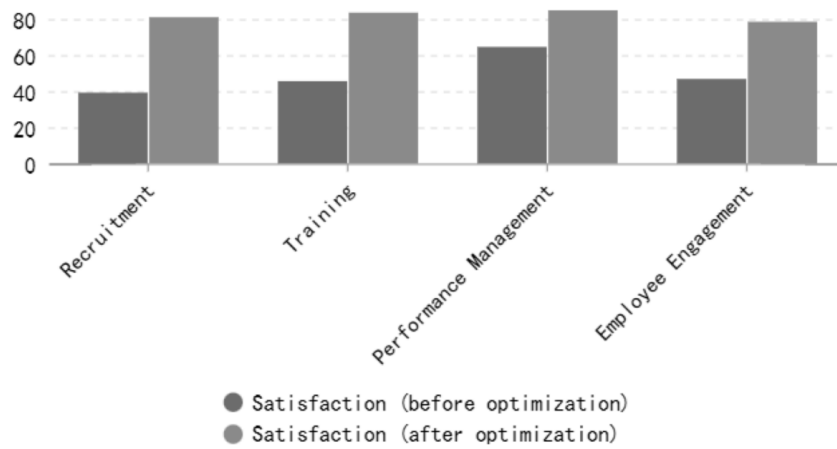
Recruitment dissatisfaction decreased from 55.69% to 11.39%, and satisfaction increased from 39.24% to 81.02%; Training dissatisfaction decreased from 48.11% to 10.12%, while satisfaction increased from 45.57% to 83.54%; Performance management satisfaction increased from 64.55% to 84.81%; Employee engagement satisfaction increased from 50.64% to 78.48%.

Figure 2 presents a visual comparison, showing higher frequencies in the satisfied categories across all four HRM dimensions after optimization.

Trends in operational and financial performance
To objectively reflect the effectiveness of HRM optimization, this study further analyzed operational and financial metrics from 2018 to 2024.

Figure 2

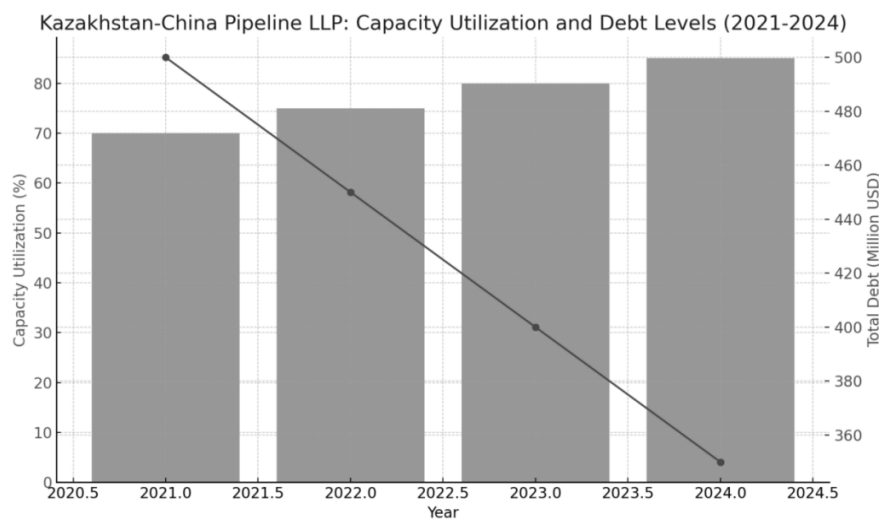
Comparison of employee satisfaction before and after HRM optimization



Note: Compiled by the authors based on the results

Figure 3

Kazakhstan- China Pipeline LLP: Capacity Utilization and Debt Levels



Note: Compiled by the authors based on the results

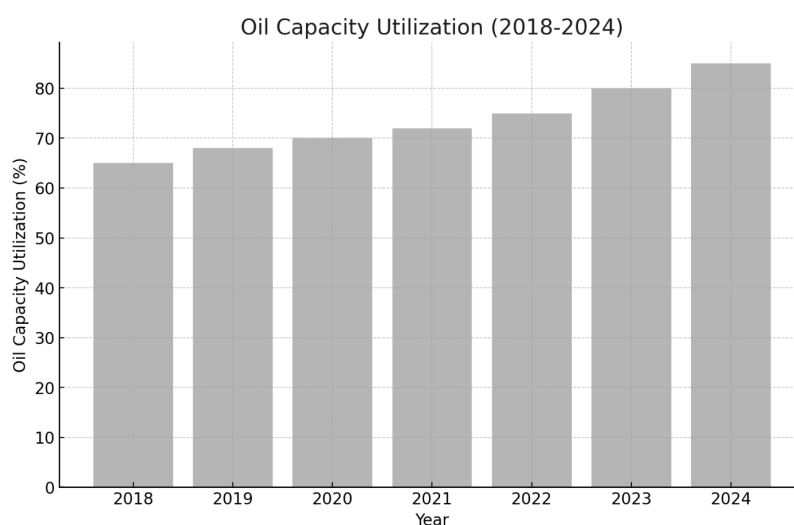
Figure 3 shows that capacity utilization increased from 70% to 85% between 2021 and 2024. During the same period, total liabilities decreased from approximately \$500 million to \$350 million.

Figure 4 shows a continuous rise in capacity utilization, increasing from 65% in 2018 to 85% in 2024.

Figures 5 and 6 present the financial structure indicators. The asset-liability ratio decreased from 60% in 2018 to 47% in 2024, while the interest-bearing debt ratio declined from 40% to 27% over the same period.

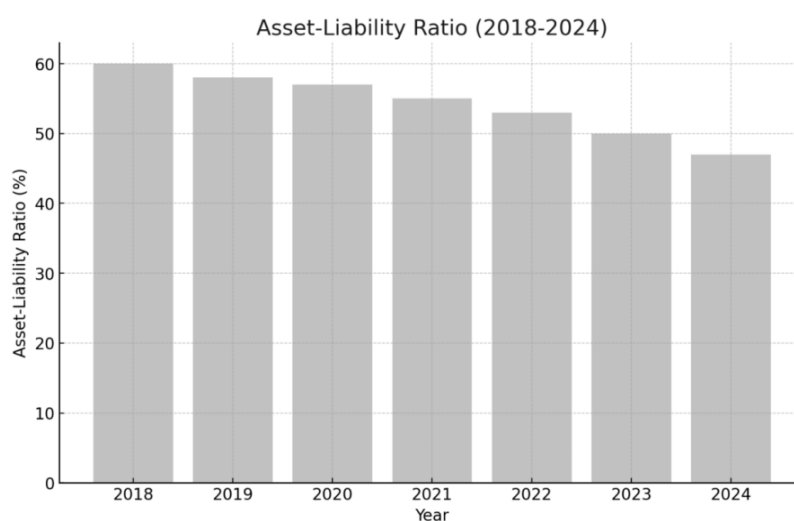
Validity and reliability testing of survey instruments

Figure 4
Oil capacity utilization, 2018-2024



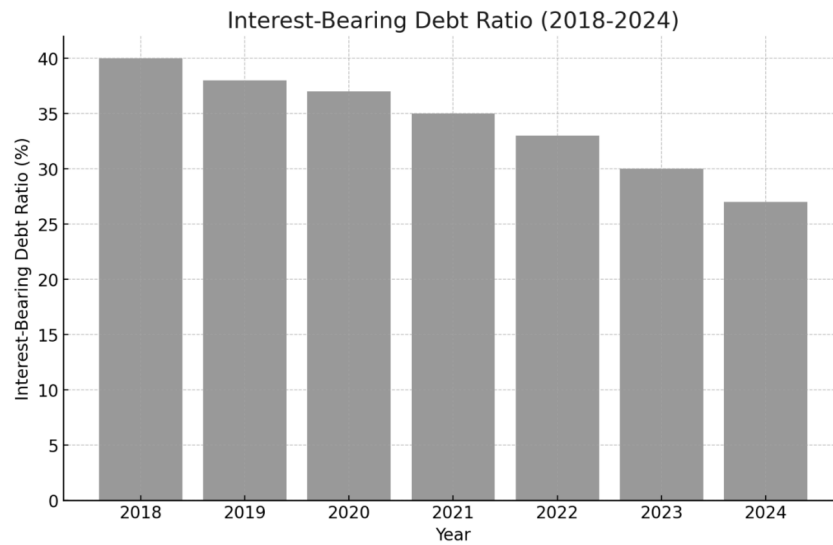
Note: Compiled by the authors based on the results

Figure 5
Asset-liability ratio, 2018-2024



Note: Compiled by the authors based on the results

Figure 6
Interest-bearing debt ratio, 2018-2024



Note: compiled by the authors based on the results

Table 4
Cronbach's alpha of Questionnaire on Motivation Factors

Indicator	Cronbach's Alpha
Recruitment Satisfaction	0.85
Training Satisfaction	0.82
Performance Management	0.87
Employee Engagement	0.89
Overall Satisfaction	0.88

Note: Compiled by the authors based on the results

Cronbach's alpha coefficients for all four HRM dimensions exceeded 0.80 (Table 4), indicating acceptable internal consistency among items.

Table 5
KMO and Bartlett's Test Results

Test	Value
KMO Value	0.85
Bartlett's Test of Sphericity	
Approx. Chi-Square	732.56
df	120
Sig.	0.000

Note: Compiled by the authors

The Kaiser-Meyer-Olkin (KMO) value was 0.85, and Bartlett's test of sphericity was statistically significant ($\chi^2 = 732.56$, $df = 120$, $p < .001$), supporting the suitability of the dataset for factor extraction (Table 5).

Table 6
Exploratory Factor Analysis Results

Factor	Variables Included	Eigenvalue	Variance Explained (%)
Factor 1	Recruitment, Training, Performance Management	2.75	68.50
Factor 2	Employee Engagement	1.25	31.50

Note: Compiled by the authors

Exploratory factor analysis using principal component extraction and Varimax rotation produced two factors with eigenvalues greater than 1. Factor 1 included recruitment, training, and performance management. Factor 2 included employee engagement. Together, the two factors accounted for the total variance among the four constructs (Table 6).

Table 7
ANOVA Results

Source of Variance	Sum of Squares	df	Mean Square	F-value	p-value
Recruitment Satisfaction	120	4	30.00	5.60	0.002
Training Satisfaction	110	4	27.50	4.90	0.003
Performance Management	150	4	37.50	6.20	0.001
Employee Engagement	130	4	32.50	5.40	0.002
Error	100	20	5.00	-	-
Total	610	36	-	-	-

Note: Compiled by the authors

ANOVA was employed to test whether the difference in satisfaction levels before and after HRM optimization was statistically significant. As shown in Table 7, all four HRM dimensions exhibited significant differences ($p < 0.05$). The highest F-value was observed in performance management ($F = 6.2$, $p = 0.001$).

The results show an overall increase in satisfaction across all four HRM dimensions following the optimization. Operational indicators also show higher capacity utilization together with lower debt ratios. The ANOVA results further identified statistically significant differences between the pre- and post-optimization measurements.

The survey results indicate that recruitment and training showed the greatest improvements following the HRM adjustments. The interview findings helped explain these improvements. HR managers reported that clearer recruitment criteria and multilingual training reduced employees' uncertainty during the onboarding process and helped them understand organizational expectations more quickly. As a result, employees became more confident in their daily work and were more willing to take initiative. These findings are consistent with the survey results and highlight the importance of localized recruitment and training practices in motivating employees.

Employee engagement improved more gradually than the other HRM dimensions. Managers explained that employee engagement developed gradually because trust and effective communication require time in cross-border organizations. Regular communication between Chinese and local employees reduced misunderstandings and gradually strengthened employees' willingness to participate in organizational activities.

To understand how these motivational changes relate to organizational performance, the study ex-

amined operational and financial indicators. If HRM practices successfully enhance employee motivation, corresponding improvements should also be reflected in organizational performance. In pipeline companies, innovation rarely appears as patents or new technologies. It is more often reflected in fewer disruptions, smoother coordination, and more reliable systems. Because traditional innovation indicators are not available for this case, capacity utilization and debt reduction offer practical measures of operational improvement. Both indicators improved during the study period.

Following the HRM improvements, higher capacity utilization suggests more stable and efficient operations, while lower debt ratios suggest improved financial stability. The interview findings provide further support for these findings. Managers reported that standardized training, clearer communication, and localized incentive mechanisms improved coordination and reduced operational delays. These observations are consistent with the improvements in capacity utilization and financial performance, suggesting that localized HRM practices contributed to innovation-related performance primarily through better organizational processes rather than direct technological innovation.

Overall, the mixed-methods findings suggest that locally adapted HRM practices enhanced employee motivation and supported innovation-related performance in this cross-border SOE. While the survey identified the observed changes, the interviews provided contextual explanations for how and why these changes occurred.

Conclusion

Using the Kazakhstan-China pipeline project as an example, this study examines how strategic human resource management practices affect em-

employee motivation, which in turn shapes innovation performance. The study utilized a mixed-methods design, combining questionnaire and interview findings to draw several conclusions:

The internationalization of HRM practices is crucial for enhancing employee motivation. Research findings indicate that directly replicating the parent company's standardized processes often fails in cross-border environments. In contrast, HRM that reflect local cultural norms, institutional constraints, and employee expectations tend to be more readily accepted and yield higher satisfaction levels. For instance, greater job security, equitable performance rewards, and work arrangements aligned with local practices. Improvements in recruitment and training contributed most significantly to this shift in incentives.

An increase in staff motivation is closely linked to significant improvements in operational and financial performance. Following adjustments to HRM, innovation metrics improved in tandem with increased employee engagement. In an energy industry environment with limited information transparency, this model suggests that stronger employee motivation contributes to process-level innovation. This is because it promotes smoother workflows, better coordination and more stable operations. Third, the cross-border environment plays a decisive role in the effectiveness of HRM practices. Institutional differences, cultural distance, and geopolitical sensitivities can impact employees' understanding of management initiatives. A flexible HRM approach emphasizing cross-cultural communication and targeted support is crucial for maintaining employee engagement and performance in complex settings.

This study holds both theoretical and practical significance. Theoretically, it proposes a framework linking human resource management, motivation, and innovation, explicitly incorporating cross-border environmental factors. Empirical research on SOEs (particularly in the energy sector) remains limited in this field. Practically, the findings pro-

vide guidance for Chinese SOEs operating overseas. Research indicates that effective incentive mechanisms, higher employee engagement, and a focus on cross-cultural management can enhance innovation performance.

Although this study provides a contextual understanding of HRM adaptation in Belt and Road energy projects, certain limitations should be concerned. This analysis is based on a single case study, and the findings may not be fully applicable to other industries or host country environments. In addition, innovation performance is assessed through indirect operational and financial metrics. While these metrics are applicable in this context, they do not encompass all aspects of innovation. In the future, the study can be extended to more cases of "Belt and Road" projects for comparative analysis, and try to introduce more direct innovation metrics to further deepen the understanding of HRM and innovation mechanisms in the cross-border context.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval/ consent

Participation in the questionnaire survey and interviews was voluntary. All participants were informed about the purpose of the study, and informed consent was obtained prior to participation. No personally identifiable information is reported in this study.

Authors' contributions

DJ: Conceptualisation, methodology, investigation, data curation, formal analysis, visualisation, drafting the initial version.

BM: Conceptualisation, supervision, validation, drafting – peer review and editing.

All authors have reviewed the final version of the manuscript and approved it for publication.

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Information about the authors:

Jiang Dekun (corresponding author)- PhD doctoral student, Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: jiangdekun0909@gmail.com).

Mukhamediyev Bulat – Doctor of Economics, Professor, al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: bmukhamediyev@gmail.com).

Авторлар туралы мәлімет:

Цзян Дэжунь – PhD докторанты, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы, Қазақстан, e-mail: jiangdekun0909@gmail.com).

Мұхамедиев Булат – э.г.д., профессор, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы, Қазақстан, e-mail: btukhamediyev@gmail.com).

Сведения об авторах:

Цзян Дэжунь – PhD-докторант, Казахский национальный университет имени аль-Фараби (Алматы, Казахстан, e-mail: jiangdekun0909@gmail.com).

Б.М. Мухамедиев – д. э. н., профессор, Казахский национальный университет имени аль-Фараби (Алматы, Казахстан, e-mail: btukhamediyev@gmail.com).

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