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Problems of Management

Original article

Risk assessment of Sino-Russian interstate projects based on indicator system of fuzzy analytic hierarchy process*

Wang Xiaohan

Henan University of Economics and Law, Henan, China,
275557347@qq.com, https://orcid.org/0000-0002-1187-258X

Abstract

Purpose. The purpose of this study is to comprehensively and objectively evaluate the risks of Sino-Russian interstate projects, and further promote the accumulation of project management experience and the improvement of management techniques.

Methods. The author adopts the Fuzzy Analytic Hierarchy Process (FAHP) method to conduct further data analysis based on the risk assessment indicator system. The author uses the expert questionnaire survey method. Based on the survey results, a fuzzy judgment matrix is constructed, and weights are assigned to the indicators. With these weight data, the comprehensive importance ranking of the risk assessment indicators for Sino-Russian interstate projects can be obtained.

Results. The author obtained the following results through data analysis. In the risk assessment of the Sino-Russian interstate project: In terms of behavioral risk, attention should be paid to the ability of subcontractors to fulfill their contracts on schedule during the construction phase, and efforts should be made to explore international standards applicable to both China and Russia. In terms of management risk, importance should be attached to the cultivation of international project management talents, and it is necessary to explore the training mode of project management talents for Sino-Russian projects; and the concept of the sustainable development of the project should be emphasized. In terms of process risk, attention should be paid to the screening of project categories and schemes. In terms of external risk, it is necessary to optimize project policies and industrial policies and accelerate the progress of project approval.

Conclusions. The results of the model analysis provide in detail the specific ranking of the key risk factors of Sino-Russian interstate projects, offering an academic increment for the risk research in this field. In subsequent studies, empirical analysis can be further carried out for specific projects. The research findings put forward corresponding improvement suggestions for the risk management of Sino-Russian interstate projects.

Keywords: risk management, interstate project, project management, fuzzy judgment matrix, assign weights, Fuzzy Analytic Hierarchy Process, behavioral risk, management risk, process risk, external risk

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Проблемы управления

Научная статья
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Оценка рисков китайско-российских межгосударственных проектов на основе системы индикаторов нечеткого аналитического иерархического процесса

Ван Сяохань

Университет экономики и права, Хэнань, Китайская народная республика
275557347@qq.com, https://orcid.org/0000-0002-1187-258X

Аннотация

Цель. Всесторонняя и объективная оценка рисков китайско-российских межгосударственных проектов, а также дальнейшее накопление опыта управления проектами и совершенствование методов управления.

Методы. Автор использует метод нечеткого аналитического процесса иерархии (FAHP) для проведения анализа данных на основе системы показателей оценки риска. Автор использует метод экспертного анкетного опроса. По результатам опроса строится матрица нечетких суждений, показателям присваиваются веса. С помощью данных весовых коэффициентов можно получить комплексный рейтинг важности показателей оценки рисков для китайско-российских межгосударственных проектов.

Результаты. В результате анализа данных при оценке рисков китайско-российского межгосударственного проекта автор получил следующие результаты. С точки зрения поведенческого риска, следует обратить внимание на способность субподрядчиков выполнять свои контракты в срок на этапе строительства, а также приложить усилия для изучения международных стандартов, применимых как в Китае, так и в России. С точки зрения управленческого риска, следует уделить внимание подготовке международных талантов в области управления проектами, необходимо изучить способ подготовки талантов в области управления проектами для китайско-российских проектов; также следует подчеркнуть концепцию устойчивого развития проекта. С точки зрения риска процесса, необходимо уделить внимание отбору категорий и схем проектов. С точки зрения внешнего риска необходимо оптимизировать проектную политику и промышленную политику, а также ускорить процесс утверждения проектов.

Выводы. Результаты модельного анализа позволяют детально проранжировать ключевые факторы риска китайско-российских межгосударственных проектов, что дает академическое приращение для исследования рисков в этой области. В последующих исследованиях эмпирический анализ может быть проведен для конкретных проектов. Результаты исследования содержат соответствующие предложения по улучшению управления рисками китайско-российских межгосударственных проектов.

Ключевые слова: управление рисками, межгосударственный проект, управление проектами, нечеткая матрица суждений, присвоение весов, нечеткий аналитический процесс иерархии, поведенческий риск, управленческий риск, процессный риск, внешний риск

Для цитирования: Ван Сяохань. Оценка рисков китайско-российских межгосударственных проектов на основе системы индикаторов нечеткого аналитического иерархического процесса // Государственное и муниципальное управление. Ученые записки. 2025. № 1. С. 23–31. https://doi.org/10.22394/2079-1690-2025-1-1-23-31. EDN ZGWHEN

Highlights

1. Expert Questionnaire Survey.
2. Based on the results of pairwise importance comparisons, a fuzzy complementary judgment matrix is established.
3. Calculate the fuzzy consistent matrix and the weight vector.
4. Calculate and obtain the weights of the risk assessment indicators for Sino-Russian interstate projects.
5. Ranking the indicators according to their comprehensive importance and conduct analysis and evaluation.

Introduction

The paper focuses on the field of risk assessment of Sino-Russian interstate projects. The risk analysis combines qualitative and quantitative methods. The quantitative analysis of interstate project risks is a process of quantifying the probability of risk occurrence and its impact on the project. The result of quantitative analysis is the probability distribution of project objectives in the context of overall risk events. In order to transform the fuzzy information of risk indicators into definite information, the author adopts the Fuzzy Analytic Hierarchy Process (FAHP).

The combination of fuzzy mathematics and the AHP is relatively widely applied in the research on the risk issues of interstate projects. The authors Davatgar et. al. discusses the importance of risk assessment and management in the oil and gas industry and provide an accurate and reliable risk analysis for oil platforms, particularly the floating platform Goliat. The study emphasizes the importance of management factors combined with technical and technological aspects in the performance of safety barriers and allows for the assessment of dynamic risk across the plant [1]. Lee J. k. et al. use subcontractor performance levels and a risk framework for the interface between the general contractor and subcontractors. Cost, schedule, and quality of project results are applied to assess performance. The 77 risks identified are correlated and analyzed to determine key risks from two perspectives [2]. Li X. et. al. propose a method for evaluating the performance of lean construction management in engineering projects based on the network process-fuzzy comprehensive evaluation (ANP-FCE) model. Analytic Network Process (ANP) and Super Decisions (SD) software are utilized to calculate the weights of the indicators and verify their validity [3].

In the field of interstate project risk research, there are relatively few articles addressing the risk assessment of Sino-Russian interstate projects. Therefore, the author focuses on risk identification, evaluation, and analysis of the life-cycle of Sino-Russian interstate projects. This study can fill certain research gaps in this field and provide references for risk control in the extensive interstate project cooperation between Russia and China. Given the current situation of comprehensive strategic cooperation between Russia and China, interstate projects are the main form of cooperation. Thus, the findings of this study hold certain practical significance and reference value.

Materials and Methods

The three main steps of FAHP include the formation of hierarchical formation, pairwise comparison, and ranking of indicators according to the comprehensive importance. In previous study, the hierarchical model of risk indicators for Sion-Russian interstate projects was established in the first step [4]. This study focuses on the specific analysis of the second and third steps.

The steps of Fuzzy Analytic Hierarchy Process (FAHP) are:

1. Hierarchy formation. Constructing the risk factor hierarchy model.

2. Pairwise comparisons. Constructing a fuzzy complementary judgment matrix.

Domain experts are required to complete pairwise comparisons of the indicators at each level. Considering the decision-making objectives, the relative importance of each of the two criteria in the second level of the hierarchical structure is compared. Each of the two sub-criteria under the same criterion (level two) is also compared. According to the model and results, construct the fuzzy judgment matrix R for each level of risk factors separately. Matrix R represents the relative importance comparison between all the relevant indicators in the lower level corresponding to an indicator in the upper level. In order to further quantify the judgment, the scale method of 0.1-0.9 is generally applied. As shown in Table 1.

To construct the fuzzy judgment matrix, the following definition is given.

Noting that $K = \{1,2,\cdots,n\}$.

ⅰ: If matrix $F = (f_{ji})_{n*n}$ satisfies: $0 \le f_{ij} \le 1$, $(i, j \in K)$, then F is a fuzzy matrix [5].

ⅱ: If the fuzzy matrix $R=(r_{ji})_{n*n}$ satisfies: $r_{ij} + r_{ji} = 1$, $(i, j \in K)$, then R is a fuzzy complementary matrix [6].

ⅲ: If the fuzzy matrix $R=(r_{ji})_{n*n}$ satisfies: for any (∀) i,j,k, there are $r_{ij} = r_{ik} - r_{jk} + 0.5$, $(i, j, k \in K)$, then R is a fuzzy consistent matrix [7].

Fuzzy consistent matrix is necessarily fuzzy complementary matrix. The element $r_{ii} = 0.5$ on the diagonal in the fuzzy complementary matrix.

Table 1. 0.1-0.9 scale method and its definition [8]

Scale	**Definition**
0.9	Indicator i is extremely more important than indicator j
0.8	Indicator i is strongly more important than indicator j
0.7	Indicator i is significantly more important than indicator j
0.6	Indicator i is slightly more important than indicator j
0.5	Indicator i is equally important than indicator j
0.4	Indicator j is slightly more important than indicator i
0.3	Indicator j is significantly more important than indicator i
0.2	Indicator j is strongly more important than indicator i
0.1	Indicator j is extremely more important than indicator i

According to the 0.1-0.9 scale method, comparing the importance of risk indicators $U=\{a_1, a_2, \cdots, a_n\}$, the following fuzzy judgment matrix can be obtained:

$$R=\begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{n3} \end{bmatrix}$$

If the matrix R has the following properties:

a. Matrix R is a fuzzy complementary matrix.

b. The difference between the corresponding elements of any two rows of R is constant.

c. The difference between any given row of R and the corresponding element of each of the remaining rows is a certain constant.

d. The transposed matrix of R is R^T (or the residual matrix R^C) is the fuzzy consistency matrix.

The replacement of rows by columns in b, c above is still valid.

e. By deleting any row and its corresponding column from A, the resulting sub-matrix is still a fuzzy consistent matrix.

Then, the matrix R is a fuzzy consistent matrix.

The actual meaning of $r_{ij}(i, j \in K)$ is that the indicators r_i and r_j have the affiliation of the fuzzy relationship when they are compared with the indicators of the previous level. The fuzzy consistency matrix R represents the fuzzy relationships in the argument domain U "⋯ is much more important than ⋯". The value of r_{ij} is a measure of the degree of importance of a_i over a_j. The larger r_{ij} is, the more important a_i is than a_j. When the $r_{ij} > 0.5$, it means that indicator a_i is more important than indicator a_j. In the opposite, when the $r_{ij} < 0.5$, it means that indicator a_j is more important than indicator a_i.

iv. From the definition ii, the matrix $R=(r_{ji})_{n*n}$ is a fuzzy complementary matrix. Summing up the R by rows, denoted as

$$r_i = \sum_{k=1}^{n} r_{ik}, i \in K. \quad (1)$$

The fuzzy consistent matrix $R = (r_{ij})_{n*n}$ is obtained by mathematical transformation according to

$$r_{ij} = \frac{r_i - r_j}{2(n-1)} + 0.5 \quad (2)$$ [1].

The weight vector $W = (w_1, w_2, \cdots, w_n)^T$, obtained by normalizing the matrix R, satisfies

$$w_i = \frac{1}{n} - \frac{1}{2a} + \frac{1}{an}\sum_{k=1}^{n} r_{ik}, i \in K \ [9]. \quad (3)$$

The weight vector normalization condition is $\sum_{k=1}^{n} w_k = 1$.

In practice, scholars consider taking the value $a = (n-1)/2$. This is the method of taking the value that gives the most importance to the degree of importance between the elements[2].

3. Ranking of indicators in order of combined importance.

According to the above calculation steps, the relative importance of lower-level indicators with respect to higher-level indicators can be obtained. Using the results as the basis for ranking the importance of the indicators, it is possible to determine the position of each indicator in the overall system of evaluation system.

Results

Based on the risk assessment indicator system for Sino-Russian interstate projects[3], the author adopts the 21 risk factor indicators from it to establish the FAHP model.

As shown in Table 2, the criteria level is the first-level of risk factor, and the sub-criteria level is the second-level of risk factor. Sino-Russian interstate project first-level include Behavioral Risks (*R1),* Management Risk (*R2)*, Process Risk (*R3)*, External (*R4).* Each level of risk includes multiple factors, $R1=\{U_{11},U_{12},U_{13},U_{14}\}$= {Subcontractor's risk, Consulting supervision risk, Supplier's risk, Designer's risk}; $R2=\{U_{21},U_{22},U_{23},U_{24},U_{25},U_{26}\}$={Technical standard risk, Human resource risk, Security risk, Environmental risk, Collection risk, Insurance risk}; $R3=\{U_{31},U_{32},U_{33}\}$={Project selection risk, Contract risk, Completion test risk}; $R4=\{U_{41},U_{42},U_{43},U_{44},U_{45},U_{46},U_{47},U_{48}\}$={Government approval risk, International relation risk, Policy change risk, Government intervention risk, Public security risk, Exchange rate risk, Inflation risk, Risk of inadequate legal system}.

Table 2. Key indicators of risk factors for Sino-Russian interstate project[4]

Criteria level	Behavioral Risk R_1	Management Risk R_2	Process Risk R_3	External Risk R_4
Sub-criteria level	Subcontractor's risk U_{11} ; Consulting supervision risk U_{12} ; Supplier's risk U_{13}; Designer's risk U_{14}	Technical standard risk U_{21} ; Human resource risk U_{22}; Security risk U_{23}; Environmental risk U_{24}; Collection risk U_{25}; Insurance risk U_{26}	Project selection risk U_{31}; Contract risk U_{32}; Completion test risk U_{33}	Government approval risk U_{41}; International relation risk U_{42}; Policy change risk U_{43}; Government intervention risk U_{44}; Public security risk U_{45}; Exchange rate risk U_{46}; Inflation risk U_{47}; Risk of inadequate legal system U_{48}

[1] Based on the Reference 5.
[2] Based on the Reference 9.
[3] Based on the Reference 4
[4] Developed by author.

The author uses the expert survey method to investigate the importance of the risks of the Sino-Russian interstate project, and a fuzzy judgment matrix was established based on the results. The weight of criteria level relative to decision goal level, and the weight of sub-criteria level relative to criteria level are calculated by using the FAHP. Further determine the relative importance between the factors in each layer to provide reliable data support for subsequent risk analysis. A total of 30 questionnaires were sent out for this round of expert surveys. Refer to SPASSAU screening criteria for invalid questionnaires, e.g., questionnaire with missing data or with more than 80% of the same options [10].

27 valid questionnaires were screened, with an effective response rate of 90%. According to the 0.1-0.9 scale method, the fuzzy judgment matrix R of the first level is obtained by pairwise comparing the importance of the four risk factors in the criteria level.

$$R=\begin{bmatrix} 0.5 & 0.58 & 0.53 & 0.54 \\ 0.42 & 0.5 & 0.55 & 0.55 \\ 0.47 & 0.45 & 0.5 & 0.56 \\ 0.46 & 0.45 & 0.44 & 0.5 \end{bmatrix}$$

In real decision-making research, due to the complexity of things and the one-sidedness of experts' understanding of things, the judgment matrix obtained is somewhat contradictory. Therefore, it is crucial for the consistency of the fuzzy matrix R. The matrix data has consistency and can reflect the consistency of the expert's judgment. According to the definition of fuzzy consistent matrix, fuzzy mathematical transformation of fuzzy judgment matrix is performed according to (2). The fuzzy consistent matrices $R^*, U_1^*, U_2^*, U_3^*, U_4^*$ can be obtained separately. Taking the fuzzy judgment matrix R composed of the risk level indicators of the China-Russia interstate project as an example, the weight calculation process is as follows. According to (2), the fuzzy consistent matrix of matrix R^* is obtained.

$$R^*=\begin{bmatrix} 0.5 & 0.522 & 0.526 & 0.549 \\ 0.478 & 0.5 & 0.504 & 0.527 \\ 0.474 & 0.496 & 0.5 & 0.523 \\ 0.451 & 0.473 & 0.477 & 0.5 \end{bmatrix}$$

According to (3), the weight vector w_1 can be calculated:

$$a = \frac{n-1}{2} = 1.5.\ w_1 = \frac{1}{4} - \frac{1}{3} + \frac{0.5+0.522+0.526+0.549}{1.5*4} = 0.266$$

Similarly, w_2, w_3, w_4 can be calculated. Obtained the weight vector WR=(0.266,0.252,0.249,0.233)^T。

It is tested that $w_1 + w_2 + w_3 + w_4 = 1$, satisfied the weight vector normalization condition.

The weights of the evaluation indicators in the criteria level R are: Behavioral risk (0.266), Management risk (0.252), Process risk (0.249), and External risk (0.233). Based on the value of risk importance in the criteria level, it can be seen that behavioral risk and management risk are more important relative to the decision goal level.

According to the calculation method of the matrix R, the fuzzy consistent matrices $U_1^*, U_2^*, U_3^*, U_4^*$, and the weight vector WU_1,WU_2,WU_3,WU_4. As shown in Table 3. As can be seen from Table 3, it was tested that the sum of the weight vector WU_1, WU_2, WU_3, WU_4 are equal to one. The fuzzy consistent matrix $U_1^*, U_2^*, U_3^*, U_4^*$ for sub-criteria risk has satisfactory consistency, and the weights $U_1^*, U_2^*, U_3^*, U_4^*$ assigned to the matrix are reasonable. According to the relative importance of the indicators in the fuzzy judgment matrices *A*, U_1, U_2, U_3, U_4, the weights of the indicators for the risk evaluation of the Sino-Russian interstate project can be obtained. The results are shown in Table 4.

Table 3. Consistent matrix and weight vector for sub-criteria risk[1]

Sub-criteria risk	Fuzzy consistent matrix	Weight vector
U_{11}, U_{12}, U_{13}, U_{14}	$U_1^*=\begin{bmatrix} 0.5 & 0.561 & 0.606 & 0.550 \\ 0.439 & 0.5 & 0.545 & 0.489 \\ 0.394 & 0.455 & 0.5 & 0.444 \\ 0.450 & 0.511 & 0.556 & 0.5 \end{bmatrix}$	$WU_1=(0.286,0.246,0.216,0.253)^T$
U_{21}, U_{22}, U_{23}, U_{24}, U_{25}, U_{26}	$U_2=\begin{bmatrix} 0.5 & 0.521 & 0.534 & 0.562 & 0.536 & 0.571 \\ 0.479 & 0.5 & 0.513 & 0.541 & 0.515 & 0.550 \\ 0.466 & 0.487 & 0.5 & 0.528 & 0.503 & 0.537 \\ 0.438 & 0.459 & 0.472 & 0.5 & 0.475 & 0.509 \\ 0.464 & 0.485 & 0.497 & 0.525 & 0.5 & 0.535 \\ 0.429 & 0.450 & 0.463 & 0.491 & 0.465 & 0.5 \end{bmatrix}$	$WU_2=(0.182,0.173,0.168,0.157, 0.167,0.153)^T$
U_{31}, U_{32}, U_{33}	$U_3=\begin{bmatrix} 0.5 & 0.543 & 0.608 \\ 0.458 & 0.5 & 0.565 \\ 0.393 & 0.435 & 0.5 \end{bmatrix}$	$WU_3=(0.383,0.341,0.276)^T$
U_{41}, U_{42}, U_{43}, U_{44}, U_{45}, U_{46}, U_{47}, U_{48}	$U_4=\begin{bmatrix} 0.5 & 0.448 & 0.483 & 0.481 & 0.506 & 0.530 & 0.532 & 0.532 \\ 0.552 & 0.5 & 0.535 & 0.533 & 0.557 & 0.581 & 0.584 & 0.584 \\ 0.517 & 0.465 & 0.5 & 0.498 & 0.522 & 0.546 & 0.549 & 0.549 \\ 0.519 & 0.467 & 0.502 & 0.5 & 0.524 & 0.549 & 0.551 & 0.551 \\ 0.494 & 0.443 & 0.478 & 0.476 & 0.5 & 0.524 & 0.527 & 0.527 \\ 0.470 & 0.419 & 0.454 & 0.451 & 0.476 & 0.5 & 0.502 & 0.503 \\ 0.468 & 0.416 & 0.451 & 0.449 & 0.473 & 0.498 & 0.5 & 0.500 \\ 0.468 & 0.416 & 0.451 & 0.449 & 0.473 & 0.497 & 0.500 & 0.5 \end{bmatrix}$	$WU_4=(0.125,0.140,0.130,0.131, 0.124,0.117,0.116,0.116)^T$

Table 4. The weight vector of Sino-Russian interstate project risk evaluation indicator[2]

Decision goal	Criteria level	Sub-criteria level		Combined weight	Ranking
Risk assessment of Sino-Russian interstate project	Behavioral Risk (0.266)	Subcontractor's risk	(0.286)	0.07619	3
		Consulting supervision risk	(0.246)	0.06536	6
		Supplier's risk	(0.216)	0.05737	7
		Designer's risk	(0.253)	0.06724	5
	Management Risk (0.252)	Technical standard risk	(0.182)	0.04567	8
		Human resource risk	(0.173)	0.04357	9
		Security risk	(0.168)	0.04229	10
		Environmental risk	(0.157)	0.03945	12
		Collection risk	(0.167)	0.04201	11
		Insurance risk	(0.153)	0.03854	13
	Process Risk (0.249)	Project selection risk	(0.383)	0.09545	1
		Contract risk	(0.341)	0.08486	2
		Completion test risk	(0.276)	0.06868	4
	External Risk (0.233)	Government approval risk	(0.125)	0.02927	17
		International relation risk	(0.140)	0.03272	14
		Policy change risk	(0.130)	0.03038	16
		Government intervention risk	(0.131)	0.03053	15
		Public security risk	(0.124)	0.02891	18
		Exchange rate risk	(0.117)	0.02728	19
		Inflation risk	(0.116)	0.02713	20
		Risk of inadequate legal system	(0.116)	0.02711	21

[1] Developed by author.
[2] Developed by author based on the calculation result.

Discussion

The assignment of weights to the risk indicators for the Sino-Russian interstate project shows that the Sino-Russian interstate project should pay comprehensive attention to the occurrence of full life cycle risks at all levels. On Behavioral Risk, "Inadequate performance of subcontractors leading to delays. Moral hazard of subcontractor (0.07619)" and "Unfamiliarity of the designer with international standards, moral hazard on the part of the designer (0.06724)" ranked first and second respectively. The results reflect the importance of the subcontractor to fulfill the project construction obligation as scheduled and avoid the delay of the construction period in the construction stage of the Sino-Russian interstate project. The subcontractor's construction schedule is intertwined with the overall project construction process. In the planning and design stage of project, accurate grasp and understanding of international standards and scientifically sound project design are of paramount importance. It should be noted that "The consulting supervisor is not familiar with the Chinese technical specification (0.06536)" will also increase the probability of project risks due to different technical standards or unfamiliarity with the standards. Technical specifications and international standards for project construction play a strong role in restricting the project. In future interstate project cooperation between China and Russia, standards applicable to both countries need to be further explored.

On Management Risk, "Chinese technical standards are difficult to be recognized by owner (0.04567)" and "Inadequate management capacity of project manager (0.04357)" ranked first and second respectively. The significance of exploring common Sino-Russian standards was further emphasized, which is self-evident for increasing the recognition of Chinese contractors by owners in the Russian interstate contracting sector. Of course, the core of project management cannot be separated from project management talent. Because of the characteristics of interstate projects, it requires high all-round ability of project managers. The ability of project talents directly restricts the level of project management. Therefore, how to explore the future Sino-Russian project management personnel training mode and cultivate professionals adapted to Sino-Russian projects is a realistic issue that needs to be comprehensively considered by Chinese and Russian governments, universities and other institutions. Meanwhile, "Lack of basic environmental awareness and failure to take appropriate environmental protection measures (0.03945)" also needs to be implemented at all stages of the project life cycle, including project feasibility, project design and construction. In particular, the Sino-Russian project involves the Arctic region, the concepts of biodiversity and environmental sustainability need to be integrated into the whole lifecycle of project management. By sorting out the experience and lessons of China's Belt and Road Initiative historical projects, the emphasis on one of the indicators of "Failure to settle claim in a timely manner or difficulty in settling claim due to insurance processing error (0.03854)" needs to be greatly improved. Project insurance packages are available to protect the interests of contractor.

The three indicators on Process Risk are ranked at the top of all indicators respectively. The indicator “Wrong bidding strategy, inadequate project research (0.09545)” ranks first among all indicators. This result shows that the preliminary research and reasonable project selection are crucial. How to identify project categories, select project areas and directions with sustainable development capacity, and reasonably select cooperation partner are the top priority of project risk prevention and control. The contact risk “Insufficient claim awareness and contractual deficiency (0.08486)” is also extremely important in the process of Sino-Russian interstate project. Interstate project contracts need to be reviewed by a team of professionals with international project experience and knowledge of the legal provisions of different countries. Often the strong project owner has the initiative in the formulation of the contract. As a result, the professionalism of the team, the ability to identify problems with the terms of the contract, and the extent to which the terms are negotiated, are largely governed by the professional competence of the team members. The importance of this indicator once again emphasizes the importance of the competence of professionals, as well as the importance of the ability of companies to cooperate and communicate with professional teams. The indicator “Failure to meet completion standard at the time of project handover (0.07346)” puts forward requirements for meeting the standards at each point in the project construction stage. Each link is managed to standard in order to efficiently transmitted to the project completion node. Management of the project construction stage requires a high level of technical support for project management. It is of great significance to explore the management technology suitable for the Sino-Russian interstate project for the contractor to perform the contract with high quality.

On External Risk, the indicator "Subject to economic sanction or military intervention (0.03284)", "The old policies have changed, and the government has issued new policies to have a negative impact on the project (0.03094)", and "Government corruption, delaying or denying project access, or forcing corporate technology transfer (0.06868)" rank first, second, and third respectively. Today, as the Russia-Ukraine conflict continues, the great power game has made international relations more complicated. The world has shifted from a "bipolar structure" to "one superpower and multi-great power" and even "multi-polarization" in the future. Interstate projects are a product of interstate cooperation and can flourish when international cooperation is close. How to maintain frequent, close, and smooth development of interstate projects is a question that needs to be considered by the Russian and Chinese governments and large construction corporations. Similarly, project policies and industrial policies should be optimized at the governmental level, and accelerate the licensing and approval of projects that are adapted to the development of both countries. All are powerful means of institutional support that Russia and China can provide to contractors at the level of project cooperation.

Conclusion

The results of the model analysis have presented in detail the specific ranking of key risk factors in the Sino-Russian interstate projects, providing an academic increment to the risk research in this field. In subsequent study, empirical analysis can be further carried out for specific projects. The study findings have put forward improvement suggestions for the risk management of Sino-Russia interstate projects. There are certain limitations in the process of this study. The expert samples in the questionnaire survey are mainly Chinese experts on interstate projects. It is expected that more Russian experts can be reached in future study.

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Информация об авторе

Ван Сяохань – преподаватель Хэнаньского университета экономики и права, Хэнань (КНР).

Information about the author

Wang Xiaohan – Lecturer at Henan University of Economics and Law, Henan, China.

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