

# *Measurement of investment facilitation in host countries*

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**Abstract:** This study explores investment facilitation in host countries for Chinese OFDI, constructing an index system with five first-level indicators (infrastructure, financial services, labor supply, policy, and business environments) and 19 second-level indicators, using principal component analysis to determine weights. Based on findings, policy recommendations include improving China's legal system, optimizing top-level design, leveraging investment advantages, adopting differentiated strategies, and strengthening international cooperation to guide Chinese enterprises' OFDI and promote global economic cooperation.

## **1. Introduction**

### **1.1 Research Background**

Host countries' investment facilitation levels significantly impact Chinese OFDI decisions. Simplified procedures, reduced costs, and preferential policies in host countries directly influence foreign investors' choices and outcomes. High facilitation environments provide stable, transparent conditions attracting more FDI, while low facilitation environments deter investment through complex approvals and opaque policies. Chinese enterprises prioritize host countries' policy environments, legal protections, and market access when making overseas investments, as these factors determine investment efficiency and long-term success. This study evaluates host countries' investment environments through a constructed facilitation indicator system, recognizing OFDI's global economic importance and host countries' critical role in China's overseas investments.<sup>[1]</sup>

### **1.2 Research significance**

#### **1.2.1 Theoretical significance**

This study constructs an investment facilitation index system enabling cross-national comparisons and new FDI insights. It analyzes interactions between investment facilitation and political/economic/legal/cultural factors, advancing understanding of international investment dynamics.

#### **1.2.2 Practical implications**

The research aids Chinese enterprises in assessing host countries' investment environments and formulating strategies, while advising governments on attracting Chinese investment through

improved facilitation. This fosters international economic cooperation and shared development through strengthened bilateral/multilateral relations.<sup>[2]</sup>

### **1.3 Research status at home and abroad**

#### **1.3.1 Investment Facilitation Connotation**

Originating from trade facilitation, investment facilitation evolved into academic focus post-1996 Singapore Conference. Defined as creating transparent environments for FDI through streamlined procedures (John Ure, 2005; Shen Minghui, 2009), it emphasizes regulatory optimization and institutional innovation (Hoekman, 2021). APEC's 2008 Action Plan highlighted efficiency enhancement with transparency and predictability as core features (Ding Shengyi, 2023).

#### **1.3.2 Evaluation System Research**

Domestic studies since 2016 evaluate four dimensions: regulatory environment, infrastructure, financial markets, and business climate. Zhang Yabin (2016) established Belt and Road evaluation indicators including infrastructure quality and financial service efficiency.<sup>[3]</sup>

#### **1.3.3 Evaluation Methodology Studies**

Research methods include entropy method (Liu Yonghui et al., 2021), principal component analysis (Guo Xiaoming et al., 2021), and factor analysis (Zhang Jun, 2024). Studies reveal regional disparities in APEC, RCEP, and Belt and Road countries, with infrastructure and regulatory environment as key dimensions.<sup>[4]</sup>

#### **1.3.4 Literature Review**

While lacking unified definition, scholars recognize investment facilitation's distinctiveness from trade concepts. World Bank and UN indicators dominate evaluation frameworks, with principal component analysis as primary quantitative method. Further research needed in conceptual clarity and methodological innovation.

### **1.4 Research Methods**

Through theoretical analysis, principal component analysis and other methods, this paper comprehensively and systematically studies the level of investment facilitation in host countries.

#### **1.4.1 Theoretical analysis**

In the theoretical analysis part, this paper first defines the concept of investment facilitation, and clarifies its connotation and extension. On this basis, this paper combs the construction of investment facilitation evaluation system and measurement methods, in order to build a theoretical framework for research.

#### **1.4.2 Principal component analysis**

PCA is this paper's core method to quantitatively assess host countries' investment facilitation levels. The analysis follows these steps:

##### **(1) Data processing**

Data from Global Competitiveness Report and Penn World Table (2006-2019) were processed using linear interpolation for missing values and Z-score standardization to normalize indicators.

## (2) Index framework

An investment facilitation index system was developed with five dimensions: infrastructure, financial services, labor supply, policy, and business environments, supported by 19 sub-indicators. The framework combines existing research with host countries' actual conditions for scientific validity.

## 1.5 Innovation points and deficiencies

### 1.5.1 Innovation points

This study's innovations include:

#### (1) Investment facilitation index system construction

Addressing the lack of standardized evaluation frameworks in existing research, we developed a multidimensional index covering infrastructure, financial services, labor supply, policy and business environments, providing scientific evaluation tools for host country investment assessments.

#### (2) Practical policy recommendations

The study offers actionable guidance for Chinese enterprises' overseas investments and strategies for host governments to attract Chinese OFDI through improved investment facilitation, demonstrating strong practical application value.

### 1.5.2 Shortcomings

Three main limitations were identified:

#### (1) Data timeliness constraints

Analysis uses pre-2019 data due to Global Competitiveness Report methodology changes, potentially missing recent global investment environment developments and emerging trends.

#### (2) Limited geographic coverage

The 119-country sample excludes nearly half of global nations, restricting findings' generalizability and representativeness, particularly for excluded regions.

#### (3) Unmeasured influential factors

Despite multidimensional indicators, critical elements like cultural differences, social stability and environmental policies remain underrepresented due to data availability constraints. The second chapter is the establishment and calculation of investment facilitation index

## 2. The establishment and calculation of investment facilitation index

### 2.1 Definition of investment facilitation

Investment facilitation involves host countries' FDI-attraction strategies through improved business environments, reduced barriers, and efficient processes via simplified procedures, tax incentives, legal protections, and infrastructure development. Core policies include streamlined approvals, financial incentives, and legal safeguards for foreign firms, with dedicated agencies providing administrative acceleration. Cost reductions through tax breaks and land policies enhance affordability. Success relies on political stability, transparent laws, and infrastructure quality. Enhanced facilitation drives FDI inflows, fostering technology transfer, employment growth, and export expansion as key economic growth drivers.

### 2.2 Establishment of investment facilitation index system

Assessing trade facilitation faces challenges due to lacking unified standards and diverse indicators.

This study adopts methods from Wilson (2003), Wang Yuqian (2022), and Fan Xiufeng (2019), selecting five primary indicators: infrastructure (A), financial services (B), labor supply (C), policy (D), and business environment (E).

Considering post-2019 changes in the Global Competitiveness Report index system to ensure data continuity, this research established 19 secondary indicators reflecting host countries' trade policies. The system comprehensively measures trade facilitation levels while accommodating regional differences, enabling objective assessment and comparison of national performance, as show in Table 1.

Table 1 Trade facilitation index evaluation system

First-level indicators	Secondary indicators	Indicator attributes	Indicator Sources
Infrastructure environment (A)	Quality of Highway infrastructure (A1)	+	Global Competitiveness Report
	Quality of Rail Infrastructure (A2)	+	Global Competitiveness Report
	Quality of Port infrastructure (A3)	+	Global Competitiveness Report
	Quality of Aviation Infrastructure (A4)	+	Global Competitiveness report
	Quality of Electricity Supply (A5)	+	Global Competitiveness Report
Financial Services Environment (B)	Stock market financing ability (B1)	+	Global Competitiveness Report
	Venture Capital Availability (B2)	+	Global Competitiveness Report
	Banking Market Soundness (B3)	+	Global Competitiveness Report
Labor supply environment (C)	Cooperation capacity in industrial relations (C1)	+	Global Competitiveness Report
	Frequency of Hiring and firing (C2)	-	Global Competitiveness Report
	Wage flexibility (C3)	+	Global Competitiveness report
	Redundancy costs (C4)	+	Global Competitiveness Report
	Professional Management Competence (C5)	+	Global Competitiveness Report
Policy Environment (D)	Judicial independence (D1)	+	Global Competitiveness Report
	Policy Expenditure Costs (D2)	-	Global Competitiveness Report
	Regulatory Costs (D3)	-	Global Competitiveness Report
	Transparency in government decisions (D4)	+	Global Competitiveness Report
Doing Business (E)	Intellectual Property Protection (E1)	+	Global Competitiveness report
	Audit Capability (E2)	+	Global Competitiveness Report

## 2.3 Processing of relevant data and determination of index weights

### 2.3.1 Relevant data processing

Due to the differences in the evaluation criteria of the selected secondary indicators, the data were standardized in order to eliminate the differences in the data dimension and value range.

The formula for linear interpolation is as follows:

$$y = y_0 + \frac{(y_1 - y_0)}{(x_1 - x_0)} \cdot (x - x_0)$$

Where:

y is the y value at the point x to be estimated. x is the x value to be estimated. x<sub>0</sub>, y<sub>0</sub>, and x<sub>1</sub>, y<sub>1</sub> are two known points that have x values x<sub>0</sub> and x<sub>1</sub> and corresponding y values y<sub>0</sub> and y<sub>1</sub>, respectively.

The normalization method is Z-score normalization, which has the following formula:

$$z = \frac{x - \mu}{\sigma}$$

Where:

z is the normalized value.  $\mu$  is the raw data value. This value represents the mean of the data set.

$\sigma$ Is the standard deviation of the data set.

### 2.3.2 Determination of index weights

#### (1) Principal component analysis

This paper applies PCA to determine index weights. PCA transforms correlated variables into uncorrelated principal components via linear transformation, reducing data dimensionality while retaining maximum variability. Advantages include eliminating variable correlation, simplifying indicator selection, and enabling multidimensional visualization. Limitations involve potential ambiguity in component interpretation and unclear semantics when factor load signs change. The formula is as follows:

##### 1) Calculation formula of covariance matrix:C

$$C = \frac{1}{n-1} X^T X$$

Where, is the standardized data matrix, is the number of samples.  $X^T n$

##### 2) Calculation of eigenvalues and eigenvectors: $v \lambda v^T C v = \lambda v$

Where, is the eigenvector of the covariance matrix, is the corresponding eigenvalue.  $C v C \lambda$

##### 3) Eigenvalue decomposition:

Eigenvalue decomposition for covariance matrix or covariance matrix of data matrix:  $C v X C = V \Lambda V^T$

Where, is a matrix whose columns are the eigenvectors of the covariance matrix, is a diagonal matrix whose diagonal elements are the corresponding eigenvalues.  $V C \Lambda$

##### 4) Principal component score:

Let it be the original data matrix, it is the eigenvector matrix, then the principal component score can be calculated by the following formula:  $X V^T$

$$T = X V$$

Where, is a matrix where each row represents the score of a data point on the principal component.  $T$

#### (2) Correlation test and principal component coefficient measurement

In this paper, SPSS 25 is used for principal component analysis of the data after correlation processing. Firstly, KMO and Bartlett tests are performed on the standardized data, and the results are as show in Table 2 :

Table 2 Results of KMO and Bartlett tests

KMO and Bartlett test		
KMO measure of suitability for sampling.		.896
Bartlett sphericity test	Approximate Chi-square	31449.067
	Degree of freedom	171
	Salience	0.000

The results of KMO and Bartlett tests (Table2) show that the KMO test value is 0.896, greater than 0.6, and the significance is 0. The results indicate that it is very suitable for dimensionality reduction by principal component analysis. Therefore, the total variance interpretation was obtained after continued analysis of the data (Table 3). Components with feature roots greater than 1 were selected, and the cumulative variance contribution rate was 76.104% (greater than 15%), indicating that the first four principal components could represent most of the information of the original data. Therefore, the first four principal components were selected in this paper, as show in Table 3.

Table 3 Total variance interpretation

Components	Initial eigenvalues			Extract the sum of squares of loads			Rotate the load sum of squares		
	Total	Percent variance	Cumulative %	Total	Percent variance	Cumulative %	Total	Percent variance	Cumulative %
1	8.302	43.696	43.696	8.302	43.696	43.696	7.831	41.215	41.215
2	3.058	16.096	59.792	3.058	16.096	59.792	3.212	16.908	58.122
3	1.980	10.421	70.214	1.980	10.421	70.214	2.250	11.844	69.966
4	1.119	5.890	76.104	1.119	5.890	76.104	1.166	6.138	76.104
5	.744	3.918	80.022						
6	.707	3.721	83.743						
7	.674	3.545	87.288						
8	.460	2.423	89.711						
9	.386	2.032	91.742						
10	.294	1.547	93.289						
11	.275	1.449	94.738						
12	.206	1.084	95.822						
13	.181	.951	96.773						
14	.157	.826	97.599						
15	.134	.708	98.306						
16	.120	.633	98.939						
17	.087	.456	99.396						
18	.078	.413	99.809						
19	.036	.191	100.000						

The coefficients of the principal components are obtained by dividing the respective eigenvalues of the principal components (Table 4) by the square root of the corresponding load vector (Table 3) to obtain the expressions of the first four principal components. Among them, Comp1, Comp2, Comp3 and Comp4 in the expression represent the first, second, third and fourth principal components respectively, A1, A2, A3..... Etc., representing the secondary indicators of trade facilitation.

Comp1 = 0.2895 A1, A2, A3 + 0.2881 + 0.3013 + 0.2752 A4 A5 + 0.0746 + 0.2506 + 0.2888 B1 B2 B3 C1 C2 + 0.0941 + 0.2561 + 0.0854 + 0.0309 C3 C4 + 0.0593 to 0.2964 C5 D1, D2 + 0.2065 + 0.0684 + 0.3016 D3, D4 e1 + 0.3026 + 0.3203 + 0.0934 e2

Comp2 = 0.0492 A1 A2-0.0252-0.0852 A3 - A4 0.0726 + 0.5341 A5-0.0543-0.0051 - B1 B2 B3 - C1 C2 + 0.0069 + 0.04 + 0.3128 0.0097 C4 C3-0.1006-0.0823 C 5-0.0703 - D1, D2 D3 + 0.5301 + 0.0051 + 0.5381 D4-0.0103 - e1-0.0623 e2

Comp3 = 0.1123 A1 A2-0.022-0.1045 A3-0.0846 A4 0.0625 A5 0.0668 B1 B2 B3 + 0.2679 + 0.0405 + 0.0341 C1 C2 + 0.6112 + 0.533 C4 C3-0.1727-0.1002 C 5-0.0569-0.0441 D1 D2 D3-0.0405 + 0.3845 D4-0.0888 - e1-0.1592 e2

Comp4 = 0.1777 A1 A2-0.1456-0.1399 A3-0.0652 A4 A5 B1 B2 + 0.1834 + 0.4226 + 0.0265 + 0.1134 + 0.0841 B3 C1 C2 C3 C4 + 0.7799 + 0.1314 + 0.0643 + 0.144 6 c5-0.0804 D1 D2 D3-0.0227 + 0.0378 + 0.0284) D4 - e1 + e2 0.0841 0.1550

Table 4 Composition matrix

	1	2	3	4
Zscore(A1)	0.834	-0.086	-0.158	-0.188
Zscore(A2)	0.793	-0.044	-0.031	-0.154
Zscore(A3)	0.83	-0.149	-0.147	-0.148
Zscore(A4)	0.868	-0.127	-0.119	-0.069
Zscore(A5)	0.215	0.934	-0.088	0.028
Zscore(B1)	0.722	-0.095	-0.094	0.447
Zscore(B2)	0.832	-0.009	0.048	0.194

Zscore(B3)	0.246	0.547	0.057	0.12
Zscore(C1)	0.738	-0.07	0.377	0.089
Zscore(C2)	0.271	0.012	0.86	0.068
Zscore(C3)	0.089	0.017	0.75	0.139
Zscore(C4)	-0.171	-0.176	-0.243	0.825
Zscore(C5)	0.854	-0.144	-0.141	0.153
Zscore(D1)	0.869	-0.123	-0.08	-0.085
Zscore(D2)	0.197	0.941	-0.062	0.03
Zscore(D3)	0.595	0.009	0.541	-0.024
Zscore(D4)	0.269	0.927	-0.057	0.04
Zscore(E1)	0.923	-0.018	-0.125	-0.164
Zscore(E2)	0.872	-0.109	-0.224	0.089

### 2.3.3 Measurement of index weight results

The comprehensive coefficient needs to first determine the weights of the four principal components, and divide the variance contribution rate of the first principal component by the accumulated variance contribution rate to get the weight coefficient of the first principal component. Since there are negative indicators in trade facilitation, the negative indicators are taken as negative values before the final weight is determined, and the second, third and fourth principal components are followed by the same. Finally, the comprehensive coefficients are normalized. The comprehensive expression of trade facilitation (TFI) can be obtained:

TFI = 0.0725 A1, A2, A3 + 0.0700 + 0.0807 + 0.0792 A4 A5 B1 B2 + 0.1051 + 0.0893 + 0.0855 + 0.0741 + 0.1041 B3 C1-0.0825 - C2 C3 C4 + 0.0107 + 0.0860 + 0.0589 C5 + 0.0826 D1, D2, D3, D4 + 0.0902 + 0.0934 0.0976 0.0854 e1 + e2 0.0832

Table 5 Measurement results of index weights

First-level Indicators	weight	Secondary indicators	Weights
Infrastructure environment (A)	0.387946288	Quality of Highway infrastructure (A1)	0.07251815
		Rail Infrastructure Quality (A2)	0.079248892
		Port infrastructure quality (A3)	0.069987679
		Aviation Infrastructure quality (A4)	0.080715811
		Power Supply Quality (A5)	0.085475757
Financial services environment (B)	0.268529676	Stock market financing ability (B1)	0.089282077
		Venture capital availability (B2)	0.105100946
		Banking market soundness (B3)	0.074146653
Labor supply environment (C)	0.177203939	Cooperation capacity in industrial relations (C1)	0.104084454
		Frequency of hiring and firing (C2)	-0.082513311
		Salary flexibility (C3)	0.058940468
		Redundancy costs (C4)	0.010677368
		Professional management capabilities (C5)	0.08601496
Policy environment (D)	-0.007091773	Judicial independence (D1)	0.08260957
		Policy expenditure costs (D2)	-0.085439234
		Regulatory costs (D3)	-0.097643879
		Transparency of government decisions (D4)	0.09338177
Ease of doing Business (E)	0.17341187	Intellectual Property Protection (E1)	0.09022493
		Audit Capability (E2)	0.08318694

Finally, according to the comprehensive expression of trade facilitation, the weight coefficients of infrastructure environment, financial service environment, labor supply environment, policy environment and business environment are 0.3879, 0.2685, 0.1772, -0.0071 and 0.1734 respectively, as show in Table 5.

## 2.4 Analysis of investment facilitation measurement results

Most Chinese scholars divide trade facilitation into four levels: They are very convenient (above 0.8 points), relatively convenient (0.7-0.8 points), generally convenient (0.6-0.7 points) and not convenient (below 0.6 points). This paper refers to their classification criteria, and divides countries' trade facilitation scores according to the comprehensive expression of public TFI, as show in Table-6.

Table 6 Measurement results of investment facilitation of countries and regions in different regions

Types	Scoring range	Country and region
Very convenient	0.8-1.0	Canada, Denmark, Finland, Hong Kong, China, Japan, Luxembourg, Netherlands, Singapore, South Africa, Switzerland, Taiwan, China, United Kingdom, United States
More convenient	0.7-0.8	Australia, Belgium, Chile, France, Germany, Israel, South Korea, Malaysia, New Zealand Norway, United Arab Emirates
General Convenience	0.6-0.7	Austria, Bahrain, Barbados, Iceland, Ireland, Portugal, Qatar, Spain, Thailand
INconveniences	0-0.6	Albania, Algeria, Argentina, Armenia, Azerbaijan, Bangladesh, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Chad, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Dominican Republic, Eritrea, Guadalupe, Egypt, El Salvador, Estonia, Ethiopia, Gambia, Georgia, Greece, Guatemala, Guyana, Honduras, Hungary, India, Indonesia, Italy, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz Republic, Latvia, Lesotho, Lithuania, Macedonia, Madagascar, Mali, Malta, Mauritania, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Russia, Slovak Republic, Slovenia, Sri Lanka, Eswatini, Tajikistan, Tanzania, Timor-leste, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe

Included in the "very convenient" category are countries and territories such as Canada, Denmark, Finland, Hong Kong, China, and Japan, with convenience scores ranging from 0.8 to 1.0. Reflecting their near-optimal performance in terms of convenience. It shows that these areas usually have highly developed infrastructure, efficient public service system, robust economic environment and perfect social welfare system, thus providing residents with a high degree of convenience.

"More convenient" countries and regions, such as Australia, Belgium, Chile, France, Germany, etc. These countries score between 0.7 and 0.8, although slightly less convenient than the former, but still provide a relatively good living environment and business conditions. Indicating that there may be challenges in some areas, they can still provide a high level of convenience for residents in general.

Countries and territories classified as "general convenience", such as Austria, Bahrain, Barbados, etc., scored in the range of 0.6 to 0.7, suggesting potential for further improvement in convenience. There may be some level of shortfalls in key areas such as transport, communications or social services, which could have an impact on residents' experience of convenience.

Countries and regions that are "not convenient", such as Albania and Algeria, may face greater challenges in terms of infrastructure, public services, economic environment and so on. These challenges may lead to more difficulties for residents and visitors in carrying out their daily activities and business transactions.

### 3. Policy recommendations

#### 3.1 China needs to improve legal frameworks, optimize top-level design, and enhance investment environments

In globalization, China's OFDI is vital for enterprises' global operations and resource allocation. Challenges include destination selection, risk assessment (political/economic/legal/cultural), and host country policy adaptation. Host nations' political stability, market potential, and resources require thorough evaluation.

#### 3.2 Chinese enterprises should leverage advantages to optimize overseas investments

With China's economy projected to grow by 5.0% in 2024, Chinese companies are accelerating their global expansion to secure markets and strategic assets. They give priority to host countries renowned for their political stability, vibrant markets, resilient legal frameworks, and alignment with their core strategic objectives. They conduct a meticulous evaluation of the regional economic ecosystems and the accessibility of pivotal resources, thereby ensuring long-term success grounded in thorough foundational analysis.

#### 3.3 China should implement differentiated OFDI strategies

Enterprises should adapt strategies to the economic conditions and policy frameworks of host countries. They should concentrate on high-tech industries in advanced economies, where research and development investments are substantial, and prioritize infrastructure development in emerging markets, which is crucial for their growth and technological advancement. They should align strategies with legal safeguards, actively pursuing growth opportunities in favorable legal environments while implementing cautious risk-mitigation measures in restrictive areas. They should emphasize cross-cultural adaptation to enhance market penetration and bolster local impact.

### 4. Conclusion

In summary, the establishment and calculation of the Investment Facilitation Index provides a scientific tool for a systematic assessment of the investment environment. It quantifies core elements such as policy transparency, administrative efficiency, market openness, and service synergy through a multi-level indicator system and dynamic weight allocation. This index not only helps policymakers identify reform weaknesses and optimize institutional design but also provides investors with decision-making references across regions and industries. Studies have shown that the measurement results of the index can effectively reflect the differences and evolution patterns of regional investment facilitation levels through standardized data collection and model verification. In the future, it is necessary to further integrate the development trends of international economic and trade rules, improve the coverage dimensions and data granularity of the indicators, and at the same time, strengthen the application of the index in transnational policy coordination and multilateral mechanism convergence, providing a more practical analytical framework for the optimization of the global investment governance system.

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