

# Research on Comprehensive Evaluation of Business Environment in Central and Eastern Europe Based on Entropy Weight Method

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**Abstract:** Economic and trade cooperation between China and CEE countries has deepened with growing trade volumes and expanding investment. To enhance Chinese enterprises' investment and trade in CEE, an in-depth analysis of the business environment is essential. However, traditional evaluation methods used by scholars often lack a comprehensive framework, hindering the objectivity of assigning weights to various indicators. This paper uses the objective entropy method to robustly analyze the business environment in CEE, overcoming the limitations of traditional methods by adding historical and regional comparisons. An assessment model with 4 primary and 10 secondary indicators evaluates the business environment across 17 CEE countries, identifying trends and impacts on Chinese business activities. Recommendations for improvements are provided based on the analysis, guiding Chinese enterprises in navigating the CEE business environment.

**Keywords:** business environment, Central and Eastern Europe, economic and trade cooperation, Entropy Weight Method

## 1. Introduction

Since the establishment of the China-CEEC Cooperation Mechanism in 2012, economic and trade cooperation between China and CEE countries has made remarkable progress in recent years. bilateral economic and trade cooperation has been deepened, trade has been growing and two-way investment has been expanding. The cooperation mechanism covers many aspects, such as economy, trade, culture, education, tourism, science and technology, and health. Since its establishment, the cooperation platform has achieved fruitful results in various fields and made important contributions to the development of bilateral relations between China and CEE countries.

According to Xinhua News Agency, trade between China and CEE countries grew at an average annual rate of 8.1 percent, with two-way investment reached nearly 20 billion US dollars, covering a wide range of areas. In 2020, despite the impact of the COVID-19 pandemic, the trade volume between China and the 17 CEE countries still exceeded 100 billion US dollars, up 8.4% year on year. In the first quarter of 2021, the trade volume reached 30.13 billion, up 50.2% year on year, showing a strong growth momentum.

The economic and trade cooperation between China and CEE countries is not limited to trade, but also includes infrastructure construction, energy, agriculture and other fields. In 2020 alone, the value of project contracts signed by Chinese enterprises in CEE countries reached 5.4 billion, up 34.6%. In terms of infrastructure construction, China's contracted projects such as the "Budapest-Belgrade Railway" and the "Peljesac Bridge in Croatia" have made steady progress. In addition, China-Europe freight trains have played an important role during the epidemic.

On the whole, the economic and trade cooperation between China and CEE countries has shown a positive trend of development, and bilateral cooperation in various fields has been continuously deepened, providing a solid foundation for future cooperation. With the continuous progress of bilateral cooperation, it is expected that the economic and trade relations will continue to grow steadily in the future, bringing more win-win opportunities for both sides. China and CEE countries are important cooperative partners for jointly building the Belt and Road. Their economies are highly complementary and both sides are active in investment and trade. Looking ahead, the economic and trade cooperation

between China and CEE countries still enjoys broad prospects.

## **2. Research background and significance**

### **2.1 Research background**

The business environment encompasses social, economic, political, and legal factors that influence market operations and investment decisions. This environment is crucial for attracting foreign investment and deepening economic ties, particularly between China and CEE countries. The transition of CEE countries from planned to market economies, marked by political, legal, and social restructuring, has been significant since the Cold War. Their EU integration requires adaptation to EU standards while enhancing competitiveness in the global market.

Studying the business environment in CEE is essential due to ongoing economic transformations, governance improvements, and legal reforms, all of which impact foreign direct investment. Geopolitically, CEE's location as a bridge between East and West underlines its role in major international cooperation frameworks, influencing global economic interactions. The region's potential as new production and R&D hubs faces challenges like enhancing education, infrastructure, and industrial policies. In a global context marked by economic uncertainty and rising protectionism, understanding and improving the CEE business environment is vital for sustaining growth and stability.

### **2.2 Research meaning**

The CEE countries have undergone significant political and economic transformations, integrating into the global economy and strengthening their economic positions, particularly within the European Union. This makes studying their business environment vital for Chinese companies looking to operate in the region. CEE countries differ from Western European nations in terms of legal frameworks, market size, and investment incentives, which include tax breaks and subsidies aimed at attracting foreign investment. However, challenges such as smaller markets, varying infrastructure quality, and human resources may pose hurdles compared to Western Europe.<sup>[1]</sup>

Increased exchanges and cooperation between China and CEE, driven by Road and Belt initiative, have not only spurred economic growth but also enhanced cultural and political ties. For Chinese businesses, the CEE region serves as a strategic entry point into Europe, particularly in sectors like manufacturing, infrastructure, and high-tech. Understanding the business environment in CEE is crucial for developing effective market strategies. Despite opportunities, Chinese enterprises face challenges such as language barriers, cultural differences, and complex legal landscapes that increase compliance costs. Additionally, geopolitical factors can complicate sensitive projects, such as those involving technology transfers or industries like nuclear power, where political interference can disrupt normal operations. Researching the CEE business environment is essential for international, especially Chinese companies to navigate these complexities, adapt to local market conditions, and foster broader economic cooperation between CEE and the world.

## **3. Assessment of the business environment in CEE countries**

### **3.1 Theory evidence**

At present, there are four mainstream and authoritative ways to evaluate the business environment: the World Bank, the Economist Intelligence Unit (EIU), the Global Entrepreneurship Observatory (GEM) and the Global Competitiveness Report released by the World Economic Forum (WEF). This section of the research focuses on constructing an evaluation model based on existing scholarly literature and practical insights. The model incorporates four primary indicators—market environment, legal protection, government intervention, and labor and social security—each further divided into ten secondary indices. Utilizing the "entropy weight method," this study assesses the business environments of CEE countries by calculating a national business environment index. This index is instrumental in evaluating both the overall business climate of the region and the specific business environments within each country.

### 3.2 Selection of indicators and data sources

Referring to the existing literature, this model includes four first-level indicators: market environment, legal guarantee, government intervention and labor security. Combining qualitative and quantitative, according to the specific indicators, the scoring / rating results of the corresponding international authoritative analysis institutions are adopted to improve the accuracy and authority of the data sources.<sup>[2]</sup> The selected indicators are shown in the following table. (Table 1).

Table 1: Selection of business environment evaluation indicators

Market environment	Legal environment	Government intervention	Labor security
Ease of Business Index Trade Openness Index Freedom to invest in the index Financial Ease Index	Social Security Index Legal system Title Protection Index	Tax burden Monetary policy	Labor Freedom Index

### 3.3 Market environment indicators

The market environment index mainly measures the overall situation of a country in terms of enterprises, trade and investment, and finance. The duration of new enterprises, the convenience of enterprise financing and the difficulty of enterprise foreign trade are all important manifestations of a country's business environment. Referring to the World Bank's business environment evaluation index system, the market environment indicators mainly include four indicators: the business facilitation index, trade openness index, investment freedom index and financial facilitation index. The specific indicators and data sources are shown in the following table. (Table 2)

Table 2: Market environment indicators

Name of index	Index content	Data sources
Business Facilitation Index	The enterprise management situation encompasses aspects such as the formalities required for new business setup, including the number, time, cost, and minimum capital needed. It also includes licensing procedures, including time, cost, and closure-related factors like time, cost, and recovery rates.	The American Heritage Foundation
Trade Open Index	It reflects the difficulty of foreign trade, including tax rates and tariff barriers	The American Heritage Foundation
Investment Freedom Index	It reflects whether enterprises can invest freely, including whether the government encourages foreign enterprises to participate in the investment fairly, whether to control foreign exchange, whether foreign companies enjoy the same treatment, and whether the government imposes restrictions on payment, transfer and capital transactions	The American Heritage Foundation
Financial Facilitation Index	It reflects the difficulty of enterprise financing, including the degree of government control on banking services and other financial services, the difficulty of opening and operation of financial service companies, and the impact of the government on the allocation of credit funds	The American Heritage Foundation

Data source: "Business Convenience Index, Trade openness index, Investment Freedom Index, Financial Convenience Index", Heritage Foundation, accessed April 12, 2024.

The data on market environment indicators are mainly derived from the annual reports published by the Heritage Foundation and the Wall Street Journal to measure the economic freedom of various countries and regions around the world.

### 3.4 Rule of law guarantee indicators

The legal guarantee index is mainly used to measure whether the social legal system is perfect, the social security situation and whether the legal problems encountered in the process of production and operation can be effectively solved. A good legal environment is the premise of the normal operation of

enterprises and the guarantee of expanding the scale of operation. The specific indicators and data sources are shown in the table below. (Table 3)

*Table 3: Legal guarantee indicators*

Name of index	Index content	Data source
Social Security Index	Reflect the social security level of the country, the larger the index, the worse the social security level	The Australian Institute of Economics and Peace Research
Legal system	Reflect the country's legal rule and legal environment	The World Bank WGI Index
Property rights protection index	Reflect the degree of legal protection of property rights	The American Heritage Foundation

Data source: "Global Peace Index", Institute for Economics and Peace, accessed April 12<sup>th</sup>, 2024.

The legal guarantee index data are mainly obtained from the World Bank WGI Index, the Australian Institute of Economics and Peace, and the American Heritage Foundation.

### 3.5 Government intervention indicators

The government intervention indicators are mainly used to measure the tax burden of enterprises and the government's macro-control of the economy. If the tax burden is excessive and the economic inflation rate is high, it will have a negative impact on the normal production and operation of enterprises. The government can adjust the tax burden and the inflation rate to create a good production and operation environment for enterprises. The specific indicators and data sources are shown in the table below. (Table 4)

*Table 4: Indicators of government intervention*

Name of index	Index content	Data sources
Tax burden	Reflect the tax burden faced by businesses	The American Heritage Foundation
Monetary policy	Reflect the inflation level faced by enterprises and the government's price regulation	The American Heritage Foundation

Data source: "Tax Burden, Monetary Policy", Heritage Foundation, accessed April 12<sup>th</sup>, 2024.

The model data on government intervention indicators are mainly derived from the annual reports published by the Heritage Foundation and the Wall Street Journal to measure the economic freedom of countries and regions around the world.

### 3.6 Labor security indicators

Labor security indicators are mainly used to measure the situation of the labor market, such as the minimum wage level, the implementation of labor security, and the cost of firing the labor force. Labor force is one of the basic conditions for the normal operation of enterprises. A good labor market situation is conducive to creating a good business environment for enterprises. The specific indicators and data sources are shown in the following table. (Table 5)

*Table 5: Labor security indicators*

Name of index	Index content	Data sources
The Labor freedom index	It reflects the situation of the labor market, such as the minimum wage level, the enforcement of labor-related laws on labor security, the cost of firing labor, etc.	The American Heritage Foundation

Data source: "Labor Freedom Index", Heritage Foundation, accessed April 12<sup>th</sup>, 2024.

The data of this model on labor security indicators are mainly derived from the annual reports published by the Heritage Foundation and the Wall Street Journal to measure the economic freedom of various countries and regions around the world.

### 3.7 Sample selection

Central and Eastern Europe is a geopolitical concept, which generally refers to the Eastern

European countries during the Cold War controlled by the former Soviet Union, as well as the European republic of the former Soviet Union, such as the Three Baltic states, Ukraine, Belarus and Moldova. To avoid ideological and political doubts, and to bridge the gap between political and physical geography, central and eastern Europe has been emerged.<sup>[3]</sup> Based on this part, the study covers 17 countries, the Three Baltic states, the Western Balkans and the South-Eastern Balkans. Details are shown in the table below. (Table 6)

Table 6: Sample selection of the business environment assessment model in Central and Eastern Europe

Area	National English name
Visegrad V4	Poland
	Czechia
	Hungary
	Slovakia
Three Baltic states	Estonia
	Latvia
	Lithuania
The West Balkans	Albania
	Croatia
	North Macedonia
	Montenegro
	Serbia
	Bosnia and Herzegovina
	Slovenia
South East Balkans	Bulgaria
	Romania
	The Hellenic Republic

#### 4. Model construction and data processing

##### 4.1 Complete missing data and data judgment

The data used in this part are mainly derived from the research reports released by mainstream research institutions, such as the Heritage Foundation and the Wall Street Journal to measure the economic freedom of the countries and regions around the world, the WGI index released by the World Bank, and the Australian Institute of Economics and Peace. Therefore, the data in this part is basically an index calculated by each research institution by selecting indicators, and also the score calculated according to various indicators. Because there are many studies in the sample countries and the short study interval, there are no missing data.<sup>[4]</sup>

##### 4.2 Standardization and unification

For different types, units, intervals, and orders of magnitude, they need to be standardized before comprehensive measurement. Based on the collected data, this model uses the "min-max normalization" method. The raw data matrix X is assumed to be composed of m countries, n metrics, i.

$X = (X_{ij})_{m \times n}$ . Then its normalization function is as follows:

Positive indicator standardization:

$$X_{ij}^1 = \frac{X_{ij} - \min (X_{1j} \dots X_{mj})}{\max (X_{1j} \dots X_{mj}) - \min (X_{1j} \dots X_{mj})}$$

Negative index standardization:

$$X_{ij}^1 = \frac{\max (X_{1j} \dots X_{mj}) - X_{ij}}{\max (X_{1j} \dots X_{mj}) - \min (X_{1j} \dots X_{mj})}$$

The normalization instructions are given as follows:

$X_{ij}^1$  It is the standardized value of national  $i$  in the  $j$ -level 2 index. The higher the value, the higher the score, the better the business environment.

$X_{ij}$  For the initial data,  $X_{ij}^1$  To standardize the data,  $\max$  is the maximum value of the sample,  $\min$  is the minimum value of the sample data.

Before standardization, it is necessary to fully understand the meaning of the index, and choose different standardized formulas according to the positive or negative attributes of the index.

The standardization process must follow the following principles: fully understand the meaning of the original indicators, especially the source process of the scoring index must be clear; standardization must adapt to outlier values; differentiation, but not differentiation.

After standardization, all indicators fell in the  $[0,1]$  range, and the higher the scores, the better the business environment.

### 4.3 Construction of the business environment evaluation model

Business environment evaluation model construction is the existing business environment evaluation theory and practical experience of quantification and sublimation, the core content of comprehensive agglomeration, has important bearing data and analysis, is the basis of comprehensive assessment of regional and national business environment, is the basis of quantitative calculation and qualitative analysis.

The core idea of the construction of the business environment evaluation model is the way of index weighting, and the empowerment of indicators is difficult. At present, the main methods of empowerment include objective empowerment, subjective empowerment and combining subjective and objective empowerment.<sup>[5]</sup>

In this study, the entropy weight method was mainly used to empower each secondary index. The entropy method is mainly used to measure the uncertainty. The more informative the data, the less the uncertainty and the smaller the entropy. Conversely, the smaller the information content of the data, the greater the uncertainty and the greater the entropy value. According to the characteristics of entropy, the degree of randomness and the disorder of an event can be judged by calculating the size of the entropy value, or the size of the entropy value can be used to judge the dispersion of an index. The greater the degree of dispersion of the index, the influence of the index on the comprehensive evaluation, that is, the greater the weight, the smaller the entropy value. By delegating the secondary indicators, the comprehensive score of the business environment of the research subjects is obtained. The higher the country's business environment score is, the better its business environment is.<sup>[6]</sup>

## 5. Overall evaluation and ranking of CEE countries

According to the above method, the comprehensive business environment score of various countries in central and Eastern Europe from 2018-2022 is calculated, and the results are shown below. (Table 7)

Generally, the business environment scores of CEE countries are uneven, with a high degree of dispersion and an extreme difference. Among them, the Czech Republic, Estonia, Lithuania, Hungary and Latvia have always scored in the top business environment and have a superior business environment; Slovenia, Poland, Slovakia, Croatia, Bulgaria, Romania, North Macedonia seven state business scores in the middle of the business environment score, business environment is good; Montenegro, Serbia, Bosnia and Herzegovina, Greece and Albania have a poor business environment score.

In terms of the time trend, the business environment scores of CEE countries showed a trend of first decline and then increase. In 2019 and 2020, the business environment scores were overall lower than those in 2018, 2021 and 2022. COVID-19 is part of the cause. The global outbreak of COVID-19 at the end of 2019 and the global epidemic in 2020 have had a negative impact on the business environment in CEE countries. In 2021, CEE countries will gradually open up, society will operate normally, and their business environment will improve.

Table 7: Scores of business environment in CEE countries

Country /year	2018	2019	2020	2021	2022
Estonia	76.3	65.1	66.9	71.9	79.1
Czechia	84.3	80.6	84.8	85.5	78.7
Lithuania	72.3	69.2	62.3	67.1	69.6
Latvia	71.7	56.3	54.7	61.2	64.3
Hungary	63.1	54.8	55.8	64.7	63.4
Slovenia	64.1	52	55	61.7	59.2
Poland	55.3	54.4	57.7	60.7	55.6
Slovakia	54.2	49.8	48.1	54	55
Croatia	39.4	33	35.7	49.4	51.5
Bulgari	49.1	55.2	48.7	54.9	47.1
Romania	53.7	44	32.7	45.9	41.2
Albania	41.2	43.2	37.1	40.2	37.4
The Hellenic Republic	20	16.5	19.7	21.1	34.5
North Macedonia	43.9	37.2	28.5	44	32.6
Montenegro	43	34.1	27.3	38.3	30.9
Serbia	37.8	25.4	27.2	33.4	29.9
Bosnia and Herzegovina	26.9	29.6	28.3	28.8	28.7

Source: Author calculations.

In the future, CEE countries will continue to improve the business environment. The integration process with the EU is also the key to improving the business environment. For example, the attempt of Serbia and Slovenia to join the alliance.<sup>[7]</sup>

## 6. The overall Analysis of the business environment of CEE countries

Over the past decade (2013-2023), the business environment in central and Eastern Europe has undergone significant changes and developments. During this period, in the context of globalization, CEE countries made efforts to enhance their attractiveness to foreign investment through a series of economic reforms and policy adjustments, but also faced a series of challenges. This chapter will analyze the overall summary and common characteristics of the business environment in central and Eastern Europe by combining the data of Eurostat, World Bank statistics and the statistics data of the target countries.<sup>[8]</sup>

The macroeconomic landscape of CEE countries exhibited consistent growth between 2018 and 2023. Notably, Romania, Poland, and other nations saw substantial increases in nominal GDP, fostering a relatively stable market for foreign investors. Despite this growth, disparities exist, with countries like Greece and Bosnia and Herzegovina experiencing economic challenges. Efforts to enhance the business environment have been evident. Some nations, including Lithuania, Estonia, and Latvia, have excelled in global business environment rankings, showcasing improvements in enterprise setup, regulatory transparency, and infrastructure access. Reforms in governance, finance, and legal frameworks have facilitated an environment conducive to foreign investment.

However, persistent issues such as corruption continue to hinder business transparency and fairness in certain countries. While infrastructure has seen enhancements in some regions, overall improvements in transportation, communication, and energy infrastructure are necessary to meet escalating commercial demands.

In the post-epidemic era, the key areas and preferential policies for the economic development of CEE countries deserve investors' attention. For example, Poland provides additional tax exemptions for companies engaged in research and development and innovation, which provides investment incentives for high-tech companies. At the same time, the economic and trade cooperation between China and CEE countries has been deepened under the Belt and Road initiative, and the completion of the China-EU Investment Agreement has also provided new opportunities for investment cooperation.

## 7. Conclusions

The business environment in CEE has shown a positive development trend in the past decade, but it still faces challenges such as corruption and inadequate infrastructure. Governments have made some achievements in attracting foreign investment and improving the business environment, but the economic and political differences within the regions have led to an uneven business environment. When considering entering CEE markets, Chinese investors should take into account the macroeconomic stability, market openness, political risks and infrastructure construction in these countries to make informed investment decisions.

## Acknowledgements

This paper is the research result of the 2023 University-level Special Project of BISU - Assessment and Forecasting of the Business Environment in the Czech Republic (2013-2023)" (project code QYGB23A014).

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