# Comparative Analysis and Insights on the Advantages and Disadvantages of Mexico and Vietnam's Ability to Undertake Industrial Transfer Based on Entropy Method

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**Abstract: Based on the data of Mexico and Vietnam from 2012 to 2021, this paper first constructs an indicator evaluation system for the ability of the two countries to undertake industrial transfer from four aspects: industrial attraction and pulling force, industrial support and driving force, industrial development potential, and geopolitical risk. The entropy weight method is used to measure the scores of various sub indicators of the two countries' undertaking ability; further compare and analyze various aspects. The research concludes that, in terms of scores, Vietnam's advantages are mainly concentrated in industrial support power, while Mexico's advantages are concentrated in industrial attraction and geopolitical risks. Moreover, Mexico also has a weak advantage in industrial development potential. Therefore, Vietnam is more suitable for undertaking labor-intensive industries such as Chinese enterprises and traditional manufacturing, while Mexico is more suitable for undertaking China's emerging industries with international competitive advantages, such as new energy vehicles, power batteries, and photovoltaic equipment.**

**Keywords: Entropy Method; Friendly Shore; Nearshore; Undertaking Industrial Transfer Capacity; Comparative Analysis**

## 1. Introduction

After 2018, the global industrial chain has undergone further accelerated restructuring. The biggest characteristic of this round of transfer is that the main factor of its transfer is geopolitical risk factors rather than traditional cost and capital factors. The United States is attempting to gradually reduce its dependence on China's industrial chain supply through friendly and nearshore strategies. Vietnam and Mexico have become the main destinations for transfer, which will inevitably have an impact on the profitability and international development of various domestic industrial enterprises. This makes it necessary for both labor-intensive industries and emerging industries with international competitive advantages to consider a practical problem - "if they want better development, they need to transfer". So, where should they transfer to be the most efficient? And what about minimizing the risk? At present, Professor Wu Jin and Professor Hsu, Vernon Ning have conducted empirical analysis and comparison on Vietnam and Mexico, and found that Vietnam has a significant advantage in downstream commodity export risk exposure (for the United States), while Mexico has an advantage in upstream products [1]. This study indirectly shows a conclusion that Vietnam seems more suitable for transferring labor-intensive industries, while Mexico is more suitable for transferring technology and resource intensive industries. In order to further verify this conclusion, this article constructs an index evaluation system through entropy method to more detailed and in-depth evaluate the advantages and disadvantages of Vietnam and Mexico in terms of industrial attractiveness, industrial support power, and geopolitical sensitivity risk. The purpose is to provide a more comprehensive evaluation for traditional labor-intensive industries. Industry Provide information support and conclusion reference for Chinese enterprises in manufacturing and emerging industries with international competitive advantages to reduce potential transfer risks.

## 2. Literature Review

The academic community's expression of the concept of industrial transfer can be divided into two perspectives: broad and narrow. From a broad perspective, industrial transfer refers to an economic process in which the distribution of

 

industries in different countries or regions is adjusted due to changes in their comparative advantages; From a narrow perspective, it refers to the phenomenon where enterprises in growing or declining industries adapt to the changing trends of regional economic development and transfer their production through cross-regional direct investment [2]. However, after 2018, the international industrial transfer underwent different changes due to the United States' "de risky" trade strategy, breaking the rules of traditional industrial transfer. The United States, out of consideration for its own industrial chain supply security, began to vigorously promote its proposed friendly coastal strategy, which is manifested in two trends: "coastal outsourcing" and "friendly coastal outsourcing". It requires American companies in China to shift their production capacity to Southeast Asian and Latin American countries and reduce investment in Chinese industries.

Youan outsourcing refers to the abnormal industrial transfer of industries from countries such as China and Russia to political allies in Southeast Asia, East Asia, and Latin America by the United States for the sake of its own industrial chain supply security and national strategic security. The purpose is to marginalize China in the global industrial value chain and strike at China's important strategic industries. At the same time, in the long run, this outsourcing business is not conducive to the sustainable development of the global economy [3]. In 2023, The Economist magazine proposed the concept of "Altasia", which refers to 14 countries that are considered to have the ability to replace China's industrial and supply chain functions, including Vietnam, India, and Japan. The Economist believes that they have the ability to jointly resist China's manufacturing and economic development. Hong et al. also studied the opportunities and challenges faced by the Altasia system [4]. In short, due to the special geographical and economic development potential of Altasia, it may indeed have a negative impact on China's industrial upgrading and structural optimization in the future.

Nearshore outsourcing refers to the United States requiring companies to transfer their business to other countries closer to the United States. This model of industrial transfer is commonly referred to as nearshore outsourcing [5]. For example, the United States requires some of its companies to transfer some of their business to Mexico to establish production bases, in order to achieve diversified industrial distribution [6]. Some literature has discussed the problems brought about by the United States' requirement for its companies to transfer industries from China to Mexico through its nearshore strategy [7-10]. From the perspective of ideological opposition and geopolitics, the United States' approach is reasonable. Mexico naturally has higher cultural and geographical similarities with the United States, and has lower supply chain delays, which indeed has certain natural advantages. In addition, in 2020, the United States, Mexico, and Canada jointly signed the USMCA trade agreement, and tax incentives further amplified this advantage. Therefore, Chinese multinational enterprises have also begun to build factories in Mexico to better meet the requirements of the US market and government, but they are still restricted in international development.

The above literature has conducted in-depth research on the problems and current situation faced by relevant industrial enterprises in China, which has good inspiration. However, this article has also found some shortcomings in existing research. Firstly, at the spatial level, a large amount of quantitative research on the capacity of the receiving area focuses more on the analysis of the receiving capacity of a certain region or part of a country with similar or identical characteristics. At the micro level, there is relatively little research on the receiving capacity between two countries alone, and due to differences in geographical location, technological potential, and other factors between different countries, their potential risks also vary greatly; Secondly, at the perspective level, most scholars focus more on comparative analysis of transfer trends, current situations, impacts, and internal factors within a single region. There are few scholars who pay attention to the perspective of comparative analysis of the advantages and disadvantages of different transfer regions. Thirdly, in many related studies, cross-sectional data is often used for comparative analysis, which fails to better demonstrate the changes in carrying capacity over time, and the analysis of advantages and disadvantages is not comprehensive enough. Based on this, this article uses panel data from Vietnam and Mexico between 2012 and 2021. By comprehensively considering the practicality and accessibility of various factors, an indicator

 

evaluation model is established, and the entropy method is used to calculate the three-level indicators of the model. The specific advantages and disadvantages of the two countries' ability to undertake industrial transfer are comprehensively evaluated, and corresponding evaluation conclusions and recommendations for enterprise transfer are finally drawn.

Design of evaluation index system for undertaking the transfer capability of manufacturing industry

The factors influencing the ability to undertake manufacturing transfer have diverse characteristics. In order to scientifically and reasonably evaluate and compare the strengths and weaknesses of Vietnam and Mexico in undertaking manufacturing transfer, it is necessary to conduct a hierarchical analysis of a series of indicators that affect the ability to undertake, so that the overall evaluation system presents a clear hierarchical structure. Based on the principles of comparability and practicality, this article divides the indicator system into a three-level indicator system led by four primary indicators: industrial attractiveness, industrial support, industrial development potential, and geopolitical risk. It scientifically evaluates the strengths and weaknesses of Vietnam and Mexico's respective undertaking capabilities, and comprehensively analyzes which industries are suitable for both countries to undertake.

Liu Ming et al. [11] studied from the perspective of the traditional industrial division of labor system and believed that the ability to undertake the transfer of manufacturing industry refers to the ability of a country or region to develop imported manufacturing industries based on certain natural, historical, and technological organizational conditions, thereby optimizing the spatial layout of manufacturing and related industries within the region, promoting coordinated development of regional industries, and improving the quality of economic development. For a receiving location, based on the theory of comparative advantage, it needs differentiated resource endowment characteristics and relative cost advantages to attract manufacturing industries to migrate here, that is, "suction in". After suction in, combined with supporting basic conditions, they can stay and have the potential for sustainable development. Therefore, we believe that in the hierarchical system, the first level indicators with core generalization ability should include industrial attraction pull, industrial support power, industrial development potential, and geopolitical risks. Among them, the endowment of natural resources (land and water resources) [12], industrial development scale, market demand potential, and openness to the outside world determine the degree of attraction of the region to foreign manufacturing industries; After attracting enterprises, it is necessary to consider how to "stay" and integrate them into the regional economy. The driving force behind industrial support is the driving force that supports enterprises to "stay", including transportation infrastructure conditions such as railway freight volume and total railway mileage, telecommunications penetration rate (number of mobile phone subscribers, etc.), and government public service capacity (business convenience index and time required to start a business); After achieving the goal of "staying", It is necessary to promote the integration and development of transferred enterprises with existing industries, optimize and upgrade the industrial structure, extend the existing industrial chain, and form competitive advantages in emerging regions. To achieve this, it is necessary to have the potential for technological innovation (added value of medium and high-tech enterprises) and the driving force of supporting capabilities represented by industrial development potential such as capital factors. Based on the above ideas, this article designs an evaluation index system for the ability to undertake manufacturing transfer for comparative analysis (As shown in Table 1). Sun Wei and others have also conducted relevant analysis and argumentation based on a similar approach [13].

**Table 1. Evaluation Index System for the Capacity of Mexico and Vietnam to Undertake Transfer Industries**

| First-level indicator | Secondary indicator | Third-level indicator | Measurement indicators | Nature of indicators |
|---|---|---|---|---|
| Industrial attractiveness and pulling force | Natural resource endowment | Land resources | Cultivated land area | Positive indicators |
| | | Water resources | The degree of water scarcity | Reverse indicator |
| | Industrial scale | Value added of | Value added of manufacturing | Positive indicators |

 

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|---|---|---|---|---|
| | | manufacturing industry | industry | |
| | Market potential | Market demand capability | Per capita final consumption expenditure of residents | Positive indicators |
| | Degree of openness to the outside world | Foreign investment | Net inflow of foreign direct investment | Positive indicators |
| Industrial support power | Transportation infrastructure | Highway transportation capacity | Railway freight volume | Positive indicators |
| | | Highway network density | Total kilometers of railway | Positive indicators |
| | | Sea transportation capacity | Container terminal throughput | Positive indicators |
| | Communication infrastructure | Telecommunications penetration rate | Number of mobile phone subscribers | Positive indicators |
| | | Internet penetration | Number of internet broadband access | Positive indicators |
| | Government public service capability | Government service capability | Business convenience index | Positive indicators |
| | | Government service capability | Time required to start a business | Reverse indicator |
| | | Government service capability | The cost required to start a business | Reverse indicator |
| | | Government regulatory capability | Cpia | Positive indicators |
| | | Government regulatory capability | Political stability/no terrorism | Positive indicators |
| Industrial development potential | Capital elements | Human resource factors | Proportion of industrial employment | Positive indicators |
| | | Human resource factors | Per capita years of education | Positive indicators |
| | | Material elements | Proportion of total capital formation | Positive indicators |
| | | Material elements | Growth rate of total capital formation | Positive indicators |
| | Potential for technological innovation | Value added of medium and high-tech manufacturing industry | Value added of medium and high-tech manufacturing industry | Positive indicators |
| | | Number of articles in scientific journals | Number of articles published in scientific journals | Positive indicators |
| | | Number of patent applications | Number of patent applications | Positive indicators |
| | | Proportion of high-tech manufactured goods exports | Proportion of high-tech manufactured goods exports | Positive indicators |
| | | R&d researchers | R&d researchers | Positive indicators |
| Geopolitical risks | Fluctuation intensity | Geopolitical risk index | Geopolitical risk index | Positive indicators |

## 3. Research Methods

The strength of the ability to undertake industries is directly related to the subsequent evaluation of the specific strengths and weaknesses of Vietnam and Mexico. Therefore, the evaluation of the ability to undertake industries is particularly important. In order to quantitatively analyze the industrial undertaking capacity of the two countries and obtain a reasonable comparative evaluation, this article uses the entropy method to construct a segmented score matrix for the two countries at various levels, thus conducting a comparative analysis of Vietnam and Mexico at the level of a three-tier indicator system

Entropy method is an objective assignment method that assigns weights to various indicators based on their degree of variation. Compared to subjective assignment method, it has higher accuracy and better objectivity. The basic principle is that for a certain indicator, if its degree of variation is small, the amount of information it reflects will be less, and the weight assigned to it will be lower. Conversely, if its degree of variation is large, the amount of information it reflects will be more, and the weight assigned to it will be higher.

### 3.1 Method Steps

 

(1) Establish an evaluation matrix

When constructing multiple indicator matrices, assuming there are m evaluation objects, $n$ evaluation indicators, and $x_{ij}$ is the data corresponding to the $j$th measurement indicator under the $i$-th secondary indicator ($i$=1,2,..., $m$; $j$=1,2,..., $n$), the original data matrix is formed:

$$\boldsymbol{X}=\begin{bmatrix} x11 & x12 & \cdots & x1n \\ x21 & x22 & \cdots & x2n \\ \vdots & \vdots & \cdots & \vdots \\ xm1 & xm2 & \cdots & xmn \end{bmatrix} \quad (1)$$

(2) Data standardization processing

Due to the significant impact of indicators with different properties on the results, it is necessary to eliminate the influence of dimensionality in the calculation process and standardize the data. The processing procedure is as follows:

The handling of positive indicators is as follows:

$$y_{ij} = \frac{x_{ij}-\min(x_j)}{\max(x_j)-\min(x_j)} \quad (2)$$

The handling of negative indicators is as follows:

$$y_{ij} = \frac{-x_{ij}}{\max(x_j)-\min(x_j)} \quad (3)$$

The handling of moderation indicators is as follows:

$$y_{ij} = 1 - \frac{|x_{ij}-d_{best}|}{\max|x_{ij}-d_{best}|} \quad (4)$$

In equations (2) and (3), $i$ represents a secondary indicator, j represents a measurement indicator belonging to that secondary indicator, $x_{ij}$ and $y_{ij}$ represent the original and standardized measurement indicator values, respectively. To ensure the effectiveness of the standardized indicators, 0.0001 is added after the results.

(3) Define standardized values

Calculate the proportion of the $j$-th measurement indicator under the $i$-th secondary indicator as follows:

$$p_{ij} = \frac{y_{ij}}{\sum_{i=1}^{m} y_{ij}} \quad (5)$$

(4) Calculate the entropy value of the $j$th metric:

$$e_j = -\frac{1}{ln_m}\sum_{i=1}^{m} p_{ij} lnp_{ij} \quad (6)$$

(5) Calculate the degree of variation of measurement indicators

Calculate the degree of variation of the $j$th measurement indicator as follows:

$$g_j = 1-e_j \quad (7)$$

(6) Calculate the weight of measurement indicators

Calculate the weight of the $j$th measurement indicator:

$$w_j = \frac{g_j}{\sum_{j=1}^{n} g_j} \quad (8)$$

(7) Calculate the scores for each measurement indicator corresponding to each country

$$z_i = \sum_{j=1}^{n} w_j y_{ij}\ z_i = \sum_{j=1}^{n} w_j y_{ij} \quad (9)$$

### 3.2 Empirical Analysis

In terms of time frame, this article selects the period from 2012 to 2021 to grasp the current reality of the two countries' ability to undertake industries, and the data during this period is relatively complete, which is also in line with the deepening trend of offshore and friendly shore. In terms of the structure of the indicator system, this article studies the comparative analysis of the advantages and disadvantages of Mexico and Vietnam's ability to undertake industries. In order to facilitate analysis, this article selects more representative and explanatory data in the selection of the three-level indicator system. In terms of data sources, the basic data of this article comes from the RESSET macroeconomic database and the Federal Reserve Economic Database (FRED). The final comprehensive scores of the three level indicators corresponding to the two countries, calculated separately, reflect the trend of the strength and weakness of the two countries' ability to undertake industrial transfer in different aspects over time.

3.2.1 Industrial attractiveness and pulling force

From the scores of natural resource endowment indicators represented as shown in Tables 2 and 3, Vietnam shows a trend of first increasing and then decreasing in land resource scores, while Mexico continues to decline, and Vietnam also has relatively large scores. This indicates that Vietnam has certain advantages in terms of whether its land resources are abundant; In terms of whether water resources are sufficient, this article selects a reverse indicator. Therefore, the lower the score, the more advantageous it is. Mexico's score in this item continues to decline, while Vietnam's continues to rise. This proves that Vietnam has a disadvantage in the abundance of water resources, with insufficient attraction and pulling force, while Mexico has more advantages.

**Table 2. Score of Mexico in Terms of Industrial Attractiveness and Pulling Force**

| Mexico | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cultivated land area | 0.032653 | 0.032021 | 0.028603 | 0.027433 | 0.024335 | 0.00888 | 0.005182 | 0.024335 | 0.006954 | 0.007088 |
| The degree of water scarcity | 0.051639 | 0.053152 | 0.048555 | 0.047532 | 0.046247 | 0.044477 | 0.00146 | 0.000504 | 0.00146 | 0.00146 |

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|---|---|---|---|---|---|---|---|---|---|---|
| Value added of manufacturing industry | 0.006745 | 0.004213 | 0.001222 | 0.016642 | 0.01708 | 0.019914 | 0.020181 | 0.016826 | 0.018485 | 0.026569 |
| Per capita final consumption expenditure of residents | 0.004231 | 0.009064 | 0.004092 | 0.011598 | 0.004636 | 0.003203 | 0.001961 | 0.005421 | 0.106602 | 0.119758 |
| Net inflow of foreign direct investment | 0.012845 | 0.019164 | 0.005078 | 0.012341 | 0.016438 | 0.01068 | 0.012547 | 0.006768 | 0.010933 | 0.008984 |

**Table 3. Score of Vietnam in Terms of Industrial Attractiveness and Pulling Force**

| Vietnam | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cultivated land area | 0.001245 | 0.001771 | 0.000576 | 0.034698 | 0.034417 | 0.033839 | 0.031723 | 0.022052 | 0.022225 | 0.022225 |
| The degree of water scarcity | 0.023444 | 0.023444 | 0.023495 | 0.035621 | 0.036211 | 0.036998 | 0.037521 | 0.037956 | 0.038456 | 0.039452 |
| Value added of manufacturing industry | 0.003258 | 0.004054 | 0.000956 | 0.006726 | 0.011901 | 0.02306 | 0.030311 | 0.034422 | 0.035995 | 0.041013 |
| Per capita final consumption expenditure of residents | 0.009304 | 0.01017 | 0.013261 | 0.020452 | 0.013916 | 0.016167 | 0.015424 | 0.015851 | 0.009562 | 0.002254 |
| Net inflow of foreign direct investment | 0.007288 | 0.004831 | 0.023589 | 0.021398 | 0.020729 | 0.023116 | 0.022831 | 0.019006 | 0.013334 | 0.007176 |

Secondly, in terms of industry scale and market demand capacity in Tables 2 and 3, both show a fluctuating upward trend in manufacturing value added, but Vietnam's growth is more rapid; In terms of the annual growth rate of per capita consumption expenditure, both scores remained relatively stable between 2012 and 2019. However, after 2019, Mexico's score skyrocketed. Overall, although Mexico's growth rate in industrial scale is slightly weaker than Vietnam's, the sharp increase in per capita consumption expenditure growth rate after 2019 indicates that Mexico still has significant advantages in market potential and consumption potential compared to Vietnam.

Finally, as shown in Table 2 and 3, in terms of the degree of opening up to the outside world, 2013 was a watershed year for Vietnam and Mexico's scores. The former saw a significant increase in scores that year, while the latter experienced a sharp decline and remained lower than the former until 2018, when Vietnam's score sharply declined and was lower than Mexico's in 2021. Mexico, on the other hand, remained stable. Therefore, it can be inferred that Mexico's attractiveness to foreign investment has gradually become stronger than Vietnam's in recent years, with a more obvious attraction force. Mexico has certain advantages in this regard.

3.2.2 Industrial support power

**Table 4. Score of Mexico in Terms of Industrial Support and Driving Force**

| Mexico | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Railway freight volume | 0.003212 | 0.003541 | 0.004197 | 0.0098 | 0.013667 | 0.01687 | 0.020024 | 0.02223 | 0.016689 | 0.028876 |
| Total kilometers of railway | 0.001852 | 0.002291 | 0.005341 | 0.008321 | 0.010193 | 0.011371 | 0.016015 | 0.022945 | 0.033272 | 0.04159 |
| Container terminal throughput | 0.001852 | 0.001131 | 0.003566 | 0.008327 | 0.011835 | 0.02132 | 0.029598 | 0.031379 | 0.022845 | 0.041434 |
| Mobile phone subscription | 0.007521 | 0.009417 | 0.0032 | 0.006158 | 0.011618 | 0.014276 | 0.02329 | 0.024858 | 0.024806 | 0.030166 |
| Number of Internet broadband access | 0.007521 | 0.003224 | 0.004031 | 0.015351 | 0.017182 | 0.011532 | 0.014682 | 0.025943 | 0.027555 | 0.031146 |
| Business Convenience Index | 0.024819 | 0.024819 | 0.024819 | 0.024819 | 0.024819 | 0.024819 | 0.024819 | 0.024819 | 0.02541 | 0.02613 |
| The cost of starting a business process | 0.006838 | 0.001957 | 0.004213 | 0.006838 | 0.009767 | 0.017577 | 0.025388 | 0.035151 | 0.036127 | 0.041009 |
| Time required to start a business | 0.133795 | 0.133795 | 0.133795 | 0.133795 | 0.133795 | 0.133795 | 0.133797 | 0.133797 | 0.133797 | 0.133797 |
| CPIA | 0.056805 | 0.056805 | 0.056805 | 0.056805 | 0.056805 | 0.056805 | 0.056805 | 0.056805 | 0.056805 | 0.056805 |
| Political stability/no terrorism | 0.015415 | 0.015415 | 0.015415 | 0.015415 | 0.015415 | 0.030827 | 0.030827 | 0.015415 | 0.15423 | 0.15423 |

**Table 5. Score of Vietnam in Terms of Industrial Support and Driving Force**

| Vietnam | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Railway freight volume | 0.011341 | 0.008009 | 0.01566 | 0.013795 | 0.009568 | 0.005664 | 0.011783 | 0.008141 | 0.008392 | 0.008569 |

 

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|---|---|---|---|---|---|---|---|---|---|---|
| Total kilometers of railway | 0.06321 | 0.06321 | 0.06328 | 0.06452 | 0.06852 | 0.05321 | 0.06953 | 0.068524 | 0.061176 | 0.061176 |
| Container terminal throughput | 0.001298 | 0.001566 | 0.005805 | 0.009172 | 0.011138 | 0.014382 | 0.017366 | 0.022976 | 0.026212 | 0.032006 |
| Mobile phone subscription | 0.026603 | 0.01268 | 0.02899 | 0.003874 | 0.002512 | 0.015896 | 0.027578 | 0.019608 | 0.021641 | 0.015082 |
| Number of Internet broadband access | 0.001598 | 0.001639 | 0.004043 | 0.007891 | 0.015585 | 0.020529 | 0.03179 | 0.030649 | 0.032225 | 0.035986 |
| Business Convenience Index | 0.016955 | 0.009285 | 0.0109 | 0.012918 | 0.010496 | 0.009689 | 0.0109 | 0.00646 | 0.005423 | 0.004442 |
| The cost of starting a business process | 0.012568 | 0.015082 | 0.021365 | 0.022621 | 0.016338 | 0.020108 | 0.010055 | 0.008799 | 0.002515 | 0.002034 |
| Time required to start a business | 0.126384 | 0.126384 | 0.126384 | 0.126384 | 0.126384 | 0.126384 | 0.126384 | 0.126384 | 0.126384 | 0.126384 |
| CPIA | 0.168853 | 0.168853 | 0.168853 | 0.168853 | 0.168853 | 0.168853 | 0.168853 | 0.168853 | 0.168853 | 0.168853 |
| Political stability/no terrorism | 0.014561 | 0.014561 | 0.014561 | 0.014561 | 0.014561 | 0.029119 | 0.029119 | 0.014561 | 0.012089 | 0.012089 |

From the scores of the transportation infrastructure indicators represented in Tables 4 and 5, this article mainly selects three representative indicators for comparative analysis: total railway mileage, railway freight volume, and freight terminal throughput. Based on the trend of changes in the scores of comprehensive railway freight volume and total railway mileage, although Mexico's railway freight volume score is higher than Vietnam's after 2016, Vietnam has a huge advantage in the score of total railway mileage, and this advantage is long-term in trend. This indicates that Vietnam has high expectations and importance for the construction of railway infrastructure, and the development of transportation infrastructure in the future is more promising; In terms of cargo terminal throughput scores, both countries have shown an upward trend, with no significant comparison of advantages and disadvantages. Overall, Vietnam has stronger support and advantages in transportation infrastructure.

As shown in Table 4 and 5, from the perspective of communication infrastructure, both countries show a sharp fluctuation in the scores of mobile phone subscribers, with alternating increases in scores and no clear superiority or inferiority; In terms of the score of the ratio of Internet users, Vietnam has always maintained a steady upward trend since 2014, which proves that it has more supporting power and more prominent advantages in the development potential of undertaking industries in this field.

As shown in Table 4 and 5, from the perspective of government public service capability, its three-level indicators include two aspects: government service capability and government adjustment capability. In terms of government service capability, this article uses three measurement indicators, namely the ease of doing business index and the time and cost required to start a business, to evaluate it; In terms of the ease of doing business index, Mexico's score has always been higher than Vietnam's. However, in terms of the cost and time required to start a business, Mexico has a clear disadvantage. Not only does it consistently score higher than Vietnam in terms of time required, but it has also surpassed Vietnam in terms of cost required since 2017, proving that Vietnam has higher development potential and advantages in government service capabilities.

As shown in Table 4 and 5, in terms of government regulation ability, Vietnam's national policy and institutional evaluation macroeconomic management rating has always been higher than Mexico's. In terms of political stability, the scores of the two countries were basically the same before 2019, but after that, Mexico's score significantly increased. From the comprehensive score and Vietnam's current situation of undertaking industrial transfer [14], Vietnam has a certain advantage in government macroeconomic regulation ability compared to Mexico.

3.2.3 Industrial development potential

Firstly, based on the index scores of capital factors represented in Tables 6 and 7, this article divides capital factors into human resources and capital factors for comprehensive evaluation. For human resources, Mexico scored better than Vietnam in terms of proportional industrial employment before 2018, but after that, Vietnam's score significantly improved and surpassed Mexico; There is a similar trend in the score changes of labor force with higher education level. Mexico was in an advantageous

position before 2017, but after 2017, Vietnam achieved a reversal. Overall, in the comparative evaluation of human resources, Vietnam has higher development potential and advantages; In terms of material factors, overall, Mexico has been affected by the 2018 US China trade war and the strengthening of friendly and nearshore trends. The growth rate of its total capital formation and its proportion to GDP have both increased rapidly since 2018, indicating that it has a stronger advantage in accumulating material capital.

**Table 6. Score of Mexico in Terms of Industrial Development Potential**

| Mexico | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of industrial employment | 0.022036 | 0.003064 | 0.008219 | 0.012169 | 0.016928 | 0.020674 | 0.022036 | 0.017906 | 0.013471 | 0.017681 |
| Per capita years of education | 0.016 | 0.015438 | 0.013807 | 0.012016 | 0.012292 | 0.010408 | 0.008848 | 0.008835 | 0.006423 | 0.005967 |
| Growth rate of total capital formation | 0.008414 | 0.012886 | 0.006002 | 0.013987 | 0.003002 | 0.002135 | 0.001057 | 0.014417 | 0.066006 | 0.037616 |
| Proportion of total capital formation | 0.01789 | 0.010612 | 0.00895 | 0.015138 | 0.017743 | 0.015808 | 0.014029 | 0.008204 | 0.007421 | 0.006048 |
| Value added of medium and high-tech manufacturing industry | 0.005006 | 0.003717 | 0.007934 | 0.005006 | 0.017911 | 0.024843 | 0.027329 | 0.031532 | 0.032678 | 0.035621 |
| Number of articles published in scientific journals | 0.005006 | 0.002672 | 0.006325 | 0.008245 | 0.010293 | 0.014435 | 0.018257 | 0.024845 | 0.031473 | 0.035534 |
| Number of patent applications | 0.005177 | 0.006495 | 0.01053 | 0.021729 | 0.018008 | 0.012645 | 0.021407 | 0.035971 | 0.036258 | 0.038485 |
| Proportion of high-tech manufactured goods exports | 0.022957 | 0.012112 | 0.008077 | 0.011235 | 0.013746 | 0.02055 | 0.016977 | 0.017761 | 0.024917 | 0.025985 |
| Proportion of R&D researchers | 0.001023 | 0.001049 | 0.003479 | 0.009629 | 0.019532 | 0.019061 | 0.018282 | 0.023319 | 0.029807 | 0.037223 |

**Table 7. Score of Vietnam in Terms of Industrial Development Potential**

| Vietnam | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of industrial employment | 0.001524 | 0.001265 | 0.001107 | 0.006547 | 0.015009 | 0.019263 | 0.023153 | 0.032511 | 0.041453 | 0.050109 |
| Per capita years of education | 0.007659 | 0.008266 | 0.010426 | 0.010251 | 0.009369 | 0.009839 | 0.009864 | 0.010139 | 0.011808 | 0.015268 |
| Growth rate of total capital formation | 0.010657 | 0.011637 | 0.022865 | 0.024842 | 0.025668 | 0.027029 | 0.019105 | 0.017222 | 0.00524 | 0.002293 |
| Proportion of total capital formation | 0.003809 | 0.005240 | 0.000839 | 0.020834 | 0.016611 | 0.022992 | 0.019852 | 0.019418 | 0.018711 | 0.029478 |
| Value added of medium and high-tech manufacturing industry | 0.002413 | 0.005334 | 0.012446 | 0.011096 | 0.011505 | 0.013728 | 0.012447 | 0.011905 | 0.013343 | 0.013603 |
| Number of articles published in scientific journals | 0.00219 | 0.00229 | 0.002756 | 0.004737 | 0.010857 | 0.012427 | 0.019331 | 0.032485 | 0.050803 | 0.053138 |
| Number of patent applications | 0.001039 | 0.001212 | 0.005034 | 0.009633 | 0.011666 | 0.012809 | 0.018757 | 0.031636 | 0.030456 | 0.037894 |
| Proportion of high-tech manufactured goods exports | 0.009854 | 0.007348 | 0.005589 | 0.010514 | 0.01244 | 0.016645 | 0.015517 | 0.015155 | 0.016647 | 0.016418 |
| R&D researchers | 0.000658 | 0.000816 | 0.000541 | 0.001235 | 0.008992 | 0.02097 | 0.04031 | 0.056289 | 0.060142 | 0.066009 |

In terms of technological development potential, As shown in Table 6 and 7, this article uses a total of five measurement indicators for comparative evaluation. Overall, Mexico has certain advantages in the scores of medium and high-tech manufacturing value added (percentage of manufacturing value added), patent applications, and high-tech exports (percentage of manufactured goods exports). Vietnam has advantages in the number of publications in scientific journals and the score of R&D researchers (per million people), while Mexico has a weak advantage in technological potential.

3.2.4 Geopolitical risks

From the scores of the indicators representing the geopolitical risk levels of the two countries in Tables 8 and 9, it can be seen that Mexico has significant advantages in all time periods except for the period from 2016 to 2019, when its scores were basically equivalent to Vietnam's. In addition, the trend of coastal and friendly

 

development has been continuously strengthening since the Biden era. It can be foreseen that in the future, Mexico, which is closer to the United States, will further reduce its geopolitical risks and expand its advantages under the support of the USMCA.

**Table 8. Score of Mexico in Geopolitical Risk Level**

| Mexico | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Geopolitical Risk Index | 0.021396 | 0.025381 | 0.027478 | 0.023074 | 0.011958 | 0.002939 | 0.005036 | 0.003245 | 0.017201 | 0.021186 |

**Table 9. Vietnam's Score in Geopolitical Risk Level**

| Vietnam | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| Geopolitical Risk Index | 0.011753 | 0.010308 | 0.009554 | 0.008988 | 0.008485 | 0.008548 | 0.008485 | 0.008485 | 0.008108 | 0.009239 |

### 3.3 Analysis of Industry Differences and Long term Trend of Location Business

3.3.1Analysis of industry differences of location business

To further analyze the relative advantages between various industries in the two countries and determine which industries are more suitable for each country to undertake, this article introduces the location quotient analysis method to measure and improves the formula for measuring location entropy based on changes in location size.

Location quotient, also known as regional scale advantage index or regional specialization rate, refers to the ratio of the operating income of a certain industry in a region to the total industrial output value and the gross domestic product, reflecting the scale competitiveness of the industry in the region. The calculation expression is:

$$LQ_{ij}=\frac{X_{ij}/Y_{ij}}{Y_{ij}/Z_{ij}} \quad (10)$$

In the formula, $LQ_{ij}$ is the location quotient, and $i$ represents the $i$-th industry; $J$ represents the $j$th region; $X_{ij}$ represents the income indicator of the $i$-th industry in the $j$th region. $Y_{ij}$ represents the total industrial output value of the country, while $Z_{ij}$ represents the gross domestic product of the national cup. If the location quotient is greater than 1, it indicates that the industry has a scale agglomeration advantage, and the larger the location quotient, the stronger the scale advantage. If the location quotient of an industry is greater than 1.5, it indicates that the industry has a significant comparative advantage in the local area.

**Table 10. Score of Vietnam's Location Quotient**

| Vietnam | 2023 | 2024 |
|---|---|---|
| Chemical raw material and chemical product manufacturing industry | 1.142 | 1.495 |
| Pharmaceutical manufacturing | 1.307 | 1.358 |
| Semiconductor manufacturing industry | 2.775 | 2.814 |
| Furniture manufacturing industry | 1.046 | 1.068 |
| New energy vehicle industry | 0.479 | 0.508 |
| Petroleum, coal, and other fuel processing industries | 1.554 | 1.611 |
| Textile and Clothing Industry | 6.578 | 6.708 |
| Computer, communication, and other electronic equipment manufacturing industry | 20.399 | 20.548 |
| Paper and paper products industry | 0.373 | 0.398 |

**Table 11. Mexican Location Quotient Score**

| Mexico | 2023 | 2024 |
|---|---|---|
| Chemical raw material and chemical product manufacturing industry | 1.071 | 1.102 |
| Pharmaceutical manufacturing | 2.188 | 2.206 |
| Semiconductor manufacturing industry | 3.551 | 3.608 |
| Furniture manufacturing industry | 0.471 | 0.562 |
| New energy vehicle industry | 2.523 | 2.621 |
| Petroleum, coal, and other fuel processing industries | 9.089 | 9.002 |
| Textile and Clothing Industry | 0.791 | 0.885 |
| Computer, communication, and other electronic equipment manufacturing industry | 1.914 | 1.996 |
| Paper and paper products industry | 0.145 | 0.214 |

As shown in Table 10 and 11, Among the nine representative industries selected, five come from traditional manufacturing and labor-intensive industries, including chemical raw material and chemical product manufacturing, furniture manufacturing, petroleum, coal and other fuel processing industry, textile, clothing and apparel industry, and paper and paper products industry. The remaining four belong to capital-intensive and high-tech industries. In terms of scores, Vietnam has obvious advantages in traditional manufacturing and labor-intensive industries - except for petroleum, coal and other fuel processing industry, its scores in the other four industries are significantly better than Mexico's. This further illustrates the suitability of transferring traditional manufacturing and labor-intensive industries to Vietnam; Mexico's advantages are concentrated in some capital-intensive and high-tech industries. Apart from computer, communication, and other electronic equipment manufacturing industries, Mexico has certain advantages in the other three

 

representative capital intensive and high-tech industries, which also demonstrates the suitability of transferring capital intensive and high-tech industries to Mexico.

3.3.2 Long term trend analysis

Based on the long-term scoring advantages and disadvantages of the evaluation index system between the two countries (2012-2021) and the results of location quotient analysis in the past two years, Mexico has obvious advantages in technological development potential, high-tech industry foundation, and geopolitical risks. In addition, the intense competition between China and the United States in various fields will inevitably lead to the expansion of geopolitical risks in the foreseeable future. It is also worth noting that Mexico's huge advantage in the fuel processing industry may play a promoting role in the development of the country's electricity and artificial intelligence industries. These factors combined, the advantage of choosing Mexico as a bridgehead for capital intensive industries and high-tech industry transfer will inevitably become even greater in the future; For Vietnam, as it is adjacent to China, taking advantage of China's industrial transformation and upgrading and continuous investment from countries such as Japan and South Korea, developing its traditional manufacturing industry and labor-intensive industries with obvious advantages is obviously a better choice.

## 4. Conclusion and Implications for Chinese Enterprises

This article is based on empirical data from Mexico and Vietnam from 2012 to 2021, and constructs an evaluation index system consisting of three levels: industrial attractiveness, industrial support, and industrial development potential. Based on this index system, the entropy method is used to comprehensively score the strengths and weaknesses of the two countries in each sub level. After comparative analysis, the strengths and weaknesses of each country in these sub levels are determined, and finally, the most suitable industries for Vietnam and Mexico to undertake are comprehensively evaluated.

Firstly, from the results of comparative analysis, Vietnam's advantages in secondary indicators are mainly concentrated in four aspects: industrial scale, communication infrastructure, and human resources. Mexico's advantages are mainly concentrated in six aspects: market demand capacity, degree of opening up to the outside world, and technological development potential. In terms of natural resource endowment, transportation infrastructure, and government macro-control ability, Vietnam and Mexico have their own advantages and disadvantages, and there is no huge gap between the two countries; In terms of the distribution of advantages and disadvantages of measurement indicators, Vietnam has an advantage in 12 out of 24 measurement indicators, while Mexico has an advantage in 10. There is no clear advantage or disadvantage between the two countries in the other two measurement indicators. Without considering them, overall, Vietnam's advantages mainly focus on industrial support power, while Mexico's advantages focus on industrial attraction and geopolitical risks. In terms of industrial development potential, Mexico also has a weak advantage.

Based on the above research conclusions, the following insights can be drawn for enterprises in various industries in China to carry out industrial transfer.

For Chinese emerging industries with international competitive advantages, such as new energy vehicles, power batteries, and photovoltaic equipment [15-16], enterprises should transfer to Mexico to fully utilize Mexico's following three advantages to promote industrial upgrading. Firstly, Mexico has a relatively complete and diversified industrial system, and has close trade relations with the United States, which enables it to effectively utilize the tariff preferences brought by the USMCA and reduce market access costs; Secondly, domestic companies in the United States are optimistic about the potential for nearshore manufacturing, which can provide relatively high policy stability for the further development and upgrading of industries after transfer; Thirdly, the Mexican government's policy support for the new energy industry is increasing, especially in the areas of electric vehicles and clean energy. It has launched the "Maquiladora" plan, announcing that raw materials used to produce finished products for export to the United States and other places can be exempted from import tariffs and other related policies and plans, with great potential for development.

For Chinese enterprises in labor-intensive industries and traditional manufacturing, transferring to Vietnam can fully utilize its

 

relatively low labor costs compared to the domestic market and the policies that have been introduced in recent years to support the development of the manufacturing industry. Through a reasonable industrial layout, it not only helps to achieve industrial upgrading, but also opens up international markets.

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