Research Article

Risk Assessment of OFDI for Technology-Based Enterprises under the Background of “One Belt One Road”

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With the proposal of “One Belt One Road” initiative, more and more technology-driven enterprises in China are going abroad for foreign direct investment (FDI). But at the same time, due to the special geographical location of the countries along the “Belt and Road,” the turbulent geopolitical pattern, weak economic growth, and constant conflicts between religious civilizations, all these will make Chinese technology-driven enterprises’ investment in the countries along the “Belt and Road” face a nonnegligible risk. Thus, how to correctly assess and reasonably prevent OFDI risk has become urgent task for enterprises. This paper takes 20 countries along the “Belt and Road” as the research object and combines the characteristics of technology-oriented enterprises to determine the risk assessment indicators at all levels from four aspects: politics and policy, economy and finance, society and culture, and technological risks. Using fuzzy cluster analysis, the countries along the “Belt and Road” are classified into four groups: low, medium-low, medium-high, and high risks and corresponding countermeasures are proposed. Technology-oriented enterprises should raise their political risk awareness, comprehensively assess the economic and financial environment of host countries before making FDIs, implement “localized” operation and management, and pay attention to the protection of intellectual property rights.

1. Introduction

With the proposal of the “One Belt, One Road” initiative, more and more technology-driven enterprises have begun to go abroad to conduct foreign direct investment, covering 14 industries such as transportation, tourism, technology, real estate, metals, and logistics. In 2020, China’s foreign direct investment was US $132.9 billion, ranking among the top in the world. Among them, the nonfinancial direct investment in countries along the “Belt and Road” was 17.79 billion US dollars, an increase of 18.3%. In particular, investment in key industries achieved rapid growth, with investment in equipment manufacturing, information technology, scientific research, and technical services increasing by 21.9%, 9.6%, and 18.1%, respectively.

But at the same time, there are many problems in the countries along the “Belt and Road,” such as turbulent geopolitical structure, unbalanced economic structure, weak growth, and conflicts between religions and civilizations, which make Chinese technology-driven enterprises’ investment in the countries along the “Belt and Road” face a nonnegligible risk.

Therefore, according to the characteristics of technology-based enterprises, a reasonable assessment of risks in countries along the “Belt and Road” should be conducted to help Chinese technology-driven enterprises objectively understand the investment opportunities and risks in the “Belt and Road” regions and strengthen their grasp of the overseas investment environment. Furthermore, it improves the ability to prevent and control foreign direct investment risks. This is of great significance and also the research value of this paper.

Specifically, this paper attempts to select corresponding evaluation indicators from four dimensions of political policy, economy and finance, social culture, and technology, and uses the fuzzy clustering analysis method to conduct country risk analysis on 20 emerging countries along the “Belt and Road”. The results corresponded to 4 groups of low
risk, medium-low risk, medium-high risk, and high risk, respectively. And put forward corresponding countermeasures and suggestions: technology-driven enterprises should comprehensively improve their awareness of political risk prevention, comprehensively assess the economic and financial environment of the host country before foreign direct investment, implement "localized" management, and pay attention to the protection of intellectual property rights.

2. Related Work

Currently, there are many domestic and foreign research literature studies on the OFDI risks of the "Belt and Road," and most of the research results are mainly made by Chinese scholars. Zhu and Yang [1] introduced the ICRG country risk indicator and found that Chinese enterprises' investments along the "Belt and Road" have significant political risk and financial risk preference. Sun et al. [2] used SWOT analysis to divide countries along the "Belt and Road" into four types and proposed differentiated strategies according to different types of investment risks. Song and Liang [3] used the mutation series method to construct a country's risk assessment model and conducted a quantitative study on the investment risk level of countries along the "Belt and Road." Hu and Wang [4] used the method of multivariate statistical analysis to quantitatively analyze the risks of 65 countries along the "Belt and Road" and believed that the countries along the "Belt and Road" had relatively high country risks, among which the political risk factor was the most important factor. Zhou et al. [5] pointed out that among the countries along the "Belt and Road," China's OFDI in most Central and Eastern European countries has relatively small political, economic, and financial risks, while social and cultural risks are generally large.

However, the research on the risk of foreign direct investment by technology-driven enterprises is still limited. Zhou [6] contended that risks regarding product development, technology leakage, technology introduction, and technology barriers are the main risks encountered by high-tech Chinese enterprises in overseas operations. Dai [7] argued that in countries that are more conservative with foreign investment and which, for example, impose high taxes on foreign-funded enterprises and do not allow them to participate in domestic science and technology programs, technology-based enterprises intending to invest in these countries will face higher risk of policy changes. Shen and Chen [8] pointed out that, in the context of rigorous industry regulation, host country governments try to prevent foreign companies from acquiring important domestic enterprises to protect their own national security and develop their own weak industries. For capital-intensive technology-based companies, political risks may turn their investments into sunk costs that are difficult to recover, and the payback period of investments will also be elongated.

Qiu and Deng [9] pointed out that the degree of protecting intellectual property rights in countries along the "Belt and Road" is generally low, which will expose Chinese technology-based companies to the risk that their intellectual property might be acquired by the countries that their investment goes to. Fang and Song [10] believe that as many as five intellectual property-related risks are associated with trademark operation, namely, infringement of independent patents, disclosure of trade secrets, intellectual property assessment in cross-border mergers, acquisitions, and intellectual property barriers in countries along the "Belt and Road" will be the biggest obstacles to OFDI for Chinese companies in the context of the "Belt and Road" initiative. Ma and Shi [11] explored the causes of intellectual property-related risks from five viewpoints, namely, policies and laws and regulations, capital market, management, technology, and education, and put forward countermeasures and suggestions for establishing and improving China's investment system against intellectual property-related risks.

To sum up, there are not many studies on the risk of foreign direct investment by technology-based enterprises. The research mainly focuses on risk classification and intellectual property rights, and there are few studies on the country risk of countries along the "Belt and Road" [12–14]. This paper hopes to make useful additions in this regard.

3. Research Method

3.1. Selection of Evaluation Indicators. This article considers the characteristics of technology-based enterprises and the various risk factors that may be encountered in investment in countries along the "Belt and Road" and attempts to determine the indicators of risk assessment at all levels, from the political policy, economy and finance, social culture, and technology perspectives (see Table 1).

3.1.1. Political Policy-Related Risk. Political policy-related risk is one of the important risks in OFDI country risk under the background of "Belt and Road." The most remarkable difference between political policy-related risk and other types of risks is that it is largely caused by government actions. This kind of risk will entail immense losses to enterprises because political policy-related risks are highly uncertain, and it is often difficult for enterprises to predict and respond promptly. We select five indicators to measure it, namely, political stability, the degree of government corruption, policy changes, military intervention, and legal perfection.

3.1.2. Economic and Financial Risks. Economic and financial risks mainly refer to the possibility of changes in the market environment because of changes in the economic structure of the host country or changes in the financial market, which will cause losses to the investment returns of enterprises. The risk indicators that bear on the economy and finance include inflation, exchange rate fluctuation, unemployment rate, and per capita national income.

3.1.3. Sociocultural Risks. The differences in social environment and culture between China and the host countries will cause uncertainty for the OFDI of Chinese companies. When enterprises make foreign investments, whether they...
Table 1: System of risk indicators.

<table>
<thead>
<tr>
<th>Tier 1 indicator</th>
<th>Tier 2 indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political stability</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Degree of government corruption</td>
<td>$X'_{ij}$</td>
</tr>
<tr>
<td>Policy changes</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Military intervention</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Legal perfection</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Inflation</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Exchange rate fluctuation</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Per capita national income</td>
<td>$X_i$</td>
</tr>
<tr>
<td>Education level of the populace</td>
<td>$X'_{ij}$</td>
</tr>
<tr>
<td>Number of R&amp;D personnel</td>
<td>$X_i$</td>
</tr>
<tr>
<td>R&amp;D expenditure/GDP</td>
<td>$X_i$</td>
</tr>
<tr>
<td>High-tech products/exported finished products</td>
<td>$X_i$</td>
</tr>
</tbody>
</table>

can adapt to the local market environment remains an important factor when making decisions on investment and production. The indicators for measuring these risks include the education level of the populace and their religious beliefs.

3.1.4. Technical Risks. The key to maintaining and enlarging the competitive advantage of an enterprise is to continuously improve its technological level to maintain the vitality of enterprise development. The risks involved are mainly concerning the R&D, introduction, and protection of technology. Among them, the risk regarding technology R&D and technology introduction is mainly caused by the host country’s lack of technical resources and the decline in its technological level. Therefore, the number of R&D personnel in various countries, the proportion of R&D expenditure in GDP, and the proportion of high-tech products in exported finished products are adopted as the indicators. The risk of technological protection is measured by the indicator of legal perfection. Given that the legal system has been used as the indicator in the measurement of political risk, it will not be reused in this article.

3.2. Sample Selection and Data Sources. Considering the availability of data, we select 20 countries along the Belt and Road as the research object, namely, those in Asia, including Singapore, Malaysia, Indonesia, Philippines, India, Thailand, Turkey, Israel, Saudi Arabia, UAE, Greece, Egypt, and Kazakhstan, and those in Central and Eastern Europe, namely, Russia, Ukraine, Hungary, Czech Republic, Poland, Romania, and Bulgaria [15]. These 20 countries are dominated by emerging economies, which include only five developed economies, namely, Singapore, Israel, Greece, the Czech Republic, and Hungary [16–18].

The data are mainly derived from the World Bank’s Worldwide Governance Indicators (WGI) database, World Development Indicators (WDI) database, National Bureau of Statistics, Ministry of Commerce, and The Hofstede Center. All data are collected from 2009 to 2018.

3.3. Empirical Analysis and Results

3.3.1. Normalization of Risk Indicators. Given the considerable difference in order of magnitude and different directions among the indicators, each secondary indicator must be standardized to transform them into a dimensionless indicator within the range of $[0, 1]$. In addition, the data direction is unified: the larger the value, the smaller the risk. The normalization equation is as follows:

$$W_{ij} = \frac{X_{ij} - \min (\max)X_i}{\max (\min)X_i - \min (\max)X_i}$$

(1)

In the equation, $X_{ij}$ represents the $i$th risk value of country $j$, $X_i$ represents the $i$th risk value of all sample countries, and $W_{ij}$ represents the normalized risk value of the $i$th risk indicator of the $j$th host country.

3.3.2. Build Fuzzy Similarity Matrix. Let $X$ and $Y$ be two nonempty sets, then a fuzzy subset $\tilde{R}$ of the direct product $X \times Y = \{(x, y) \mid (x \in X, y \in Y)\}$ is called a fuzzy relation from $X$ to $Y$. The affiliation function $\delta\tilde{R} : X \times Y \rightarrow [0, 1]$ is used to describe the fuzzy relation $\tilde{R}$, a real number inside $[0, 1]$ is used to measure the case that two elements belong to the same set, which is called the affiliation degree and reflects the degree of correlation of $(x, y)$ under the fuzzy relation $\tilde{R}$, denoted as $\tilde{R}(x, y)$. When and only when fuzzy relation satisfies, then

1. Reflexivity: $\tilde{R}(x, x) = 1$
2. Symmetry: $\tilde{R}(x, y) = \tilde{R}(y, x)$

At this point, $\tilde{R}(x, y)$ denotes the degree of similarity between $x$ and $y$.

3.3.3. Cluster Analysis. Based on the fuzzy similarity matrix obtained above, the minimum fuzzy transfer matrix can be solved by the least squares method, i.e., the fuzzy equivalence matrix. The specific algorithm starts from the fuzzy similarity matrix $R$ and iteratively self-multiplies to find $R^2$, $R^4$, $\ldots$, when the first occurrence of $R^t \cdot R^t = R^t$ is the transfer closure, which is also called the fuzzy equivalence matrix.

In the actual clustering, the elements of the fuzzy equivalence matrix are assigned to $\theta$, in order of their numerical magnitude, the $\theta$ is used for truncating matrix; that is, the elements of the fuzzy equivalence matrix are compared with different $\theta$, and if the elements of the matrix $A_{ij} = \theta$, the indicator $x_i$ and indicator $x_j$ are clustered into one category, thus obtaining different classifications, and so on. The determination of the value $\theta$ during the classification is usually based on the actual situation (e.g., the number of classifications desired) to select, and the final classification results is obtained by the value of $\theta$.

On the basis of the results of the cluster analysis, the 20 countries along the Belt and Road are divided into four groups according to low-risk (A), medium-low-risk (BBB), medium-high-risk (BB), and high-risk levels (B). See Table 2 for details.
Table 2: Risk assessment of OFDI by technology-based enterprises in countries along the “Belt and Road.”

<table>
<thead>
<tr>
<th>Country</th>
<th>Risk level</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>BBB</td>
<td>2</td>
</tr>
<tr>
<td>Israel</td>
<td>BB</td>
<td>3</td>
</tr>
<tr>
<td>UAE</td>
<td>BBB</td>
<td>2</td>
</tr>
<tr>
<td>Egypt</td>
<td>B</td>
<td>4</td>
</tr>
<tr>
<td>Ukraine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td></td>
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<tr>
<td>Kazakhstan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>BB</td>
<td>3</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td></td>
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<tr>
<td>Thailand</td>
<td></td>
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<tr>
<td>Indonesia</td>
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<tr>
<td>Vietnam</td>
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<td>Vietnam</td>
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<tr>
<td>Vietnam</td>
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</table>

Table 2 reveals that the only low-risk country in the first group is Singapore, a developed country. This is largely attributable to Singapore’s perfect infrastructure, social stability, sound legal environment, and clean and efficient business environment.

There are seven moderately low-risk countries in the second group, in which Israel and the Czech Republic are developed countries. Among the countries in the Middle East, the Israeli government transfers power very stably, affords good policy continuity, and creates relatively low investment risks. The Czech Republic ranks 29th among 140 countries and regions in terms of global competitiveness, it ranks 35th among 190 global economies in terms of business environment where the investment risk is relatively low.

As many as 10 moderately high-risk countries appear in the third group, and only Greece is a developed country. After being hit hard by the European debt crisis, the current investment environment in Greece is improving by degrees, but appreciable risks exist for investors.

The highest-risk countries in Group 4 are Egypt and Ukraine, of which the political situation and economy have been turbulent and where policies are unsustainable, hence investor confidence is insufficient and investment risks are high.

4. Suggestion and Discussion

4.1. Raise the Awareness of Political Risk Prevention. When faced with international competition and making FDIs, Chinese technology-based enterprises should actively examine the political environment of the host country in advance, especially the laws, regulations, and policy restrictions concerning technology protection. Priority should be given to FDIs in low-risk and moderately-low-risk regions. If investment in moderately-high-risk and high-risk regions is necessitated by business needs, applying for political risk guarantees for overseas investment can be an option. If the investment is damaged due to political risks, the People’s Insurance Company of China can bear up to 90% of the risk responsibility [19].

Due to the complexity of political risks, enterprises cannot rely on their own strength to avoid all risks. Therefore, inter-governmental communication is an important way to promote and ensure enterprises’ investment in countries along the “Belt and Road.” The Chinese government should make the countries along the “Belt and Road” fully aware of the benefits of the “Belt and Road” initiative, fully mobilize the enthusiasm of the countries along the “Belt and Road,” and create a win-win concept of “Belt and Road” cooperation, so as to lay a good foundation for enterprises to “go global” smoothly. At the same time, the government should establish specialized information service agencies to regularly release reports regarding investment environment and risk assessment in different countries to help companies understand the political and economic environments of relevant countries in a timely manner to effectively avert investment risks. Policy support must be provided for some overseas investments of strategic significance, which, for example, are intended to acquire advanced foreign technology and expand markets and to help companies improve their relationships with local governments and reduce operational risks.

4.2. Comprehensively Assess the Host Country’s Economic and Financial Environment. The government should organize relevant departments and experts to analyze the scientific research results, materials, and statistical data of the host country, and guide enterprises to conduct on-the-spot investigations to obtain first-hand information. Only by fully investigating and evaluating various investment indicators of the host country and comprehensively investigating its management model and financial status can enterprises reduce investment risks to the greatest extent.

In low-risk countries, such as Singapore, the economic and financial environment is relatively well developed, and more attention must be directed to assessing the development of their financial system, and technology-based companies can operate as sole proprietors. In moderate-risk countries, such as Malaysia and India, the impact of changes in their economic policies should be given deserved attention, and technology-based enterprises may be considered to reduce risks through joint ventures. In high-risk countries, such as Egypt and Ukraine, the economic and financial environment is underdeveloped, and companies should focus on assessing and preventing the indirect impact of industrial changes on the FDIs oriented to the acquisition of technologies. Concurrently, given the financing needs of technology-based enterprises, risks can be passed on to the host country’s government, enterprises, or financial institutions through financing.

4.3. Implementation of “Localized” Management. Due to the differences in cultures and systems of countries along the “Belt and Road,” Chinese enterprises need to follow the local
culture and management system and improve their ability to adapt to the environment in order to achieve the goals and strategies of overseas investment.

The business philosophy of “localization” encompasses multidimensional, multilevel connotations, including not only the localization of production management but also the localization of R&D and talent management [20]. Only by implementing “localized” business management and integrating the development of enterprises into the economic and cultural development of the host country can enterprises prevent risks caused by social and cultural differences to the utmost. They can seek support from overseas Chinese to gain an in-depth understanding of local customs and values, reduce differences in managerial notions between the two parties, and prevent the loss of important employees and high-quality customer resources.

4.4. Improve the R&D Capability and Reinforce Intellectual Property Protection. The government should strengthen the protection of intellectual property rights, form an efficient international intellectual property risk early warning and emergency response mechanism, build a foreign-related risk prevention and control system for intellectual property rights, and increase assistance to Chinese enterprises in overseas intellectual property rights protection.

Technology-based enterprises should try their best to enhance their own capability in scientific research and reinforce their own advantages in technological resources. After reaching the technical level required to absorb overseas reverse technology spillovers, they can make FDIs to reduce the risks concerning technology R&D. In addition, special attention should be paid to the host country’s preferential policies, technological protection barriers, policy openness to accept investments, and preferential tax policies, which are aimed for cooperative R&D in high-tech industries, and they should prevent risks accompanying technology introduction. When making direct investments abroad, technology-based enterprises should equip themselves with the ability to protect their own intellectual property rights, and they should also be well informed about the local intellectual property laws in the host country to curb the risk of technology loss.

5. Conclusions

This paper focuses on assessing the comprehensive risks faced by technology-oriented enterprises when investing in countries along the “Belt and Road.” For the 20 countries along the Belt and Road, four primary risk indicators are selected: politics and policy, economy and finance, society and culture, and technological risks, and further refined into 14 secondary risk indicators. Using fuzzy cluster analysis, similar indicators are clustered into one category to classify the risks of 20 countries along the Belt and Road into low-risk, medium-low-risk, medium-high-risk, and high-risk levels. The specific findings are as follows:

(1) The only low-risk country is Singapore, a developed country. Among the “Belt and Road” countries, Singapore is the safest country for investment, with perfect infrastructure, social stability, sound rule of law environment, and clean-fingered and efficient government. Standard & Poor’s, Moody’s, and Fitch all have “stable” sovereign rating outlooks for Singapore.

(2) There exist seven countries with medium-low risk, among which Israel and the Czech Republic are developed countries. Among the countries in the Middle East region, Israel has a smooth regime change and good policy continuity. The Czech Republic ranks among the top countries in the world in terms of global competitiveness and business environment. Hence, these two countries have low investment risks. The remaining five countries are not developed countries, but they have high levels of economic development, its political situation is basically stable, thus it is also ranked among them.

(3) There exist 10 high-risk countries, and only Greece is a developed country. After being hit by the European debt crisis, although the current investment environment in Greece is gradually improving, due to the relatively poor business environment, weak technology base, and long-term lack of attractiveness of foreign trade, the scale of attracting foreign investment will always be ranked near the bottom in the EU.

(4) The countries with the highest risks are Egypt and Ukraine, respectively. These two countries are deeply stuck in the battlefield of the great power game externally and face multiple conflicts internally, such as leadership transition, democratic political transformation, and ethnic conflicts. Their political situation and economy have been in continuous turmoil, thus, investors’ confidence is low and the investment risk is high.

A total of 56 countries exist along the “Belt and Road,” and only 20 countries are selected as the research target of this paper for convenience, which is a small sample size. The selection of risk indicators exist subjective will, which will affect the accuracy of risk assessment. It is also a problem to be solved in future research.

Abbreviations

FDI: Foreign direct investment
OFDI: Outward foreign direct investment.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper.
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