Research Article

Systems Evaluation for Operational Risks of International Transport Corridors: A Case Study of China-Pakistan-Iran-Turkey International Transport Corridor

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Ensuring international transport corridors' safety is essential for countries along the routes. For the sustainable development of international transport channels, this paper discusses how to evaluate the operational risks and how to alleviate the adverse effects caused by emergencies. First, an indicator system of international transport corridors' operational risks was constructed, which consists of 30 indicators from five dimensions of politics, economy, society, safety, and technology. Secondly, a comprehensive scoring approach combined with a network analysis method was applied to examine the effects caused by operational hazards. On this basis, the quantitative method and rigorous statistical analysis were used to evaluate the China-Pakistan-Iran-Turkey International Transport Corridor in the south line of the Silk Road Economic Belt, whose operational risks from 2010 to 2019 were analyzed. Finally, the operational risk index was discussed in detail. Results demonstrate the following. (1) During the China-Pakistan-Iran-Turkey International Transport Corridor, the Pakistan section has the highest operational risk index, and the next culprit is Turkey, followed by Iran. The Chinese section has the lowest operational risk index. (2) Pakistan has been trapped in severe political risks and security risks in recent years. Turkey suffers from severe security risks due to the Kurdish problem. Iran ranks first in terms of economic risk and social risk. Special attention should be paid to the natural risks for China. (3) Pakistan's operational risks will exhibit consistently high in the future, while China appears downwards in long-term trend. The operational risk index in Iran is on the rise. Turkey shows a flattening of and then a slight decline in the foreseeable future.

1. Introduction

International transport corridors have strong strategic and economic attributes, which are responsible for the international trade carriers. In the One Belt and One Road Initiative, the basis and prerequisites for improving the interconnections of cross-border transport infrastructure are to build a smooth, safe, and efficient transport corridor system. International transport corridors, relying on roads, railways, water transports, aviation, pipelines, and other transportation infrastructure, supported by two or more transport line networks, are a two-way transport system in specific locations and directions, being responsible for public

and specific transport missions between countries [1]. They can achieve international transport facilitation and promote trade also as investment.

The "One Belt and One Road" strategy clearly states that we will build a new Eurasia Land Bridge, China-Mongolia-Russia Economic Corridor, China-Central and Western Asia Economic Corridor, China-Indochina Peninsula economic corridor, and other international economic cooperation corridors jointly with the countries along the Belt and Road, to form a transport network connecting East, West Asia, and South Asia gradually, and build a smooth, safe, and efficient transport corridor system [2]. Most developing countries along the Belt and Road are accompanied with different

natural environment and resource endowments [3]. The engineering projects implementation process along the Belt and Road Strategic is not only faced with constraints of host country's underdeveloped economy, inconvenient roads, and other behind-hand infrastructures [4] but also faced with the country's political instability, the government's insufficient governance, ethnic conflicts and religious contradictions, frequent terrorist incidents and even regional conflicts, and other potential risks [5–7].

As a leading strategy of the Belt and Road, infrastructure connectivity must ensure its safety and stability during the whole life cycle. Therefore, it is particularly significant to identify and evaluate the operational risks of international transport corridors. Yang et al. evaluated the construction of the primorsky No. 1 and No. 2 international transport corridors and identified the main risks were economic-related, transport infrastructure-related, policy-related, eco-environmental, and disaster-related risks [8]. Kumar and Mishra undertook an assessment of human health risk regarding mortality and morbidity induced by multiple air pollutants prevailing at 36 transport corridors of the National Capital Territory (NCT) of Delhi, India, utilizing the risk of mortality/morbidity due to air pollution model in a bid to assess the direct health impacts [9]. Schröder and Prause studied the risk management for green transport corridors and classified the risks into three categories: economical risks, ecological risks, and social risks [10]. Li and Sun analyzed the project risks of transportation in CPEC, focusing on the identification of safety factors involving political instability, terrorism, and so on and pointed out that these risks may affect the feasibility of the completion of transport projects adversely [11]. In recent years, the investment risks of overseas projects along the Belt and Road have been analyzed and evaluated from political, economic, social, environmental, legal, and security aspects [12–16]. However, there are few quantitative studies on operational risks from the perspective of international transport corridors. On the other hand, with the advance of the Belt and Road plan, the construction and operation of international transport corridors are now at full tilt, for example, the China-Pakistan Railway, the Yawan High-speed Railway, the Karakoram Highway, and the Monet Railway. So, it is of great significance to pay attention to the operational risks of these international transportation corridors.

The literature reveals the traditional and nontraditional risks in which the international transport corridor faces nowadays. However, there is no such literature, nearly previously, that reveals how to assess the operational risks of international transport corridors quantitatively. In this regard, this paper intends to construct a risk assessment index system of international transport corridors from the political, economic, social, secure, and technical dimensions, taking into account the complex feedback dependence between indicators, using the network-level risk method to calculate the weight of each index, and taking the comprehensive scoring method to carry out a comprehensive evaluation of the operational risks of the international transportation channel. The remainder of this research is organized as follows. In Section 2, the indicators that may potentially influence the operation of the international transportation corridors were identified, and an evaluation model of international transport corridors' operational risks was established. In Section 3, the operational risks from 2010 to 2019 of China-Pakistan-Iran-Turkey International Transport Corridor were analyzed and discussed in detail. Finally, the paper concludes this work in Section 4.

2. The Evaluation Model of Operational Risks for International Transport Corridors

2.1. Definition of International Transport Corridors' Operational Risks. In a broad perspective, operation refers to the maintenance of the system in a normal state, so the operational risks are the risks affecting the normal system. International transport corridors span many countries and regions, facing with so many differences in political system [17], economic condition [18], cultural diversity [19], religious belief [20], customary norm, environmental rule [21], social management system [22], and regulatory norm [23], resulting in a series of political, economic, secure, religious, and operational risks during the operational course of the international corridors [24]. In particular, Geo-traditional and nontraditional security risks from state actors have become the dominant safety elements for international transport corridors, which may lead directly to the disruption of transport corridors potentially [25].

This paper defines the operational risks of international transport channels as a negative effect on the normal smooth flow of international transport corridors, which means the possibility of damage to the channel or the negative impacts and losses due to changes in the internal and external environment.

2.2. The Evaluation System of International Transport Corridors' Operational Risks. At present, the research on the risks of international transport corridors mainly focuses on the sea transportation and energy transportation. Since the sea power theory has been put forward by American historian Alfred Mahan, the operational safety of sea transport channels has become the key concern for all countries. Stability of state power along maritime corridors, conflicts between states along routes and external powers, overlapping maritime requirements between neighboring countries, and geopolitics are the main factors affecting the operational risks of sea transport corridors [26–28]. With the advance of global economic integration, nontraditional security risks such as terrorism and piracy have become the dominant factors of the operational risks of ocean shipping channels. Specifically, for sea transportation, systemic risks exist in different kinds of reasons, including pirate attacks, terrorist incidents, regional political instability, political conflicts between states, local wars, deterioration of international relations, territorial disputes, and natural disasters, which can be broadly divided into natural environment category, social-economic category, political category, and human category, and their impacts are dynamic [29].

In the field of energy transport corridors, risks in the international oil import, oil and gas pipeline transportation, coal import and export, and natural gas transportation [30–32] were analyzed. Resources, economy, and politics are considered the main risks affecting the source of imports, while routes, carriers, ports, geopolitics, and military are considered the key factors affecting transport routes [33]. In particular, the intertwining between Geo-traditional security risks and nontraditional security risks has become a dominant threat to energy transport corridors.

Same as the sea and energy transport corridors, the international transport corridors on land are also threatened by traditional and nontraditional security risks such as political risks, economic risks, safety risks, religious risks, and terrorism. Furthermore, international transport corridors will face technical risks during the construction period. An evaluation system for the operational risks of international transport corridors was constructed, which contains a total of 30 specific indicators in five categories: political risks, economic risks, social risks, security risks, and technical risks (Table 1).

Among the indicators, political risks refer to the adverse effects of a country's political events and political relations, which are the key points for developing an international transport channel and have crucial impacts on its efficiency. The economic risks are not only affected by the economic environment of the countries along the routes but also affected by the changes of the international economic environment, which may seriously restrict the normal promotion, resulting in the lack of funds during the construction process. The social risks refer to regional differences, cultural estrangements, religious ethnic groups, and other adverse effects during the construction and actual operation of the channel. Security risks refer to the acts of creating social panic, endangering public safety, violating personal property, and destroying the normal operation by means of violence, intimidation, destruction, war, and so on. Data shows that the current nontraditional security risks such as terrorism, religious extremism, and ethnic separatism are becoming prominent factors increasingly, which affect foreign investment, tourism, and international exchange fiercely. The occurrence of security risk events may directly lead to interruption and have a great destructive impact on the normal operation of international transport corridors. However, with the progress of technology, the technical impacts on international transport channels have been gradually weakened, but it is still hard to overcome the constraints of harsh natural environment, poor connectivity of facilities, and insufficient technical personnel.

2.3. Evaluation Methodology of Operational Risks for International Transport Corridors.
The international transport corridors' operational risk index is used to measure the safety condition of an international transport based on a risk assessment framework, reports aggregate, and individual safety indicators for different countries along the route, with five dimensions of political risks, economic risks, social risks, security risks, and technical risks. The total risk index is set to score 100 points, the higher the value, the higher the risk. In this paper, the operational risk index (ORI) is evaluated by a comprehensive scoring method:

$$ORI = w_i \cdot f_i, \quad i = 1, 2, 3 \ldots, \tag{1}$$

where w_i represents the weight of an indicator and f_i represents the specific values of each indicator.

Quantitative data on risk factors were derived from authoritative databases such as the World Bank, the International Monetary Fund (IMF), Bloomberg, the World Governance Index (WGI), the Global Peace Index (GPI), Inform, and the International Guide to National Risks (see Table 1). Trend extrapolation was used to supply some individual missing data. The minimum-maximum normalization and deviation standardization method was used to eliminate the influence of positive and negative direction indicators. Finally, we got the standardized data.

For data collection $[x_i], x_i \geq 0$, we transformed the data in the dataset to $[a, b] (a < b)$ the interval by transforming it through

$$x_i^* = \frac{x_i - x_l}{x_u - x_l} (b - a) + a. \tag{2}$$

For a set of indicators with a negative number, the original data was linearly changed by deviation standardization to obtain a standardized value (measured as percentage). The reverse indicator was calculated as follows:

$$x_i^* = \left| \frac{x_u - x_i}{x_u - x_l} \right| * 100. \tag{3}$$

For the positive indicators, the indicator was calculated as follows:

$$x_i^* = \left| \frac{x_i}{x_u - x_l} \right| * 100, \tag{4}$$

where x_u represents x_i the upper bound of the value, x_l which means x_i the next term of the value; x_i^* is a value that x is converted to a percent system after standardization, and the higher the final score, the higher the risk.

In determining the weight of the indicators, taking into account the complex feedback dependency between the indicators of the operational hazards, the risk network structure model of the international transport channel was established (as shown in Figure 1) by using the advantages of analytic network process [34] (ANP) in the decision-making processing of the complex dynamic system.

Experts' evaluation information was collected, including the interrelation between the various indicators and the importance between the indicators. The weighted super matrix and the limit super matrix were calculated by using super decision-making software. The specific weight of each indicator was obtained, which passed the consistency test. Finally, we obtain the specific weights of each indicator; all indicators' weights passed the consistency test:

TABLE 1: The operational risk indicators and their data sources.

| Categories	Subgroup	Risk factors	Volume of the index	Sources	Series
Political risks P	Government capacity	Political system stability index	0–100, reversal	WGI	01
		Validity of government index	0–100, reversal	WGI	02
		State legitimacy	1–10, reversal	FSI	03
		Military intervention	0–6, positive	ICRG	04
	Corruption risks	Corruption perception index	0–100, positive	INFORM	05
		Foreign exchange and cooperation index	0–10, reversal	ICRG	06
	Diplomatic risks	Extern intervention index	0–10, positive	FSI	07
Economic risks E	Development level	Economic disequilibrium index	0–10, positive	FSI	08
		Income gini coefficient	0–100, positive	INFORM	09
		Economic volatility	positive	WDI	10
	Trade risks	Economic freedom of the world index	0–100, reversal	CEIC	11
		Net barter terms of trade index	0–2000, reversal	WDI	12
	Inflation risk	Inflation rate	positive	WEO	13
	Financial risks	Capital account openness	reversal	Bloomberg	14
	Unemployment risk	Unemployment rate	0–100, positive	WEO	15
Social risks S	Internal conflict	GCRI conflict index	0–10, positive	IFORM	16
		Religious tensions	0–10, reversal	ICRG	17
		Ethnic tensions	0–10, reversal	ICRG	18
	Security and protection	Safety index	0–100, reversal	NUMBEO	19
		Crime index	positive	UNODC	20
	Social resilience	Environmental policy	1–10, reversal	BTI	21
		Labor regulation	0–10, reversal	EFW	22
		Rule of law	0–100, reversal	WGI	23
	Cultural risks	Culture conflict	0–10, positive	GEERT HOFSTEDE	24
Security risks X	Violent conflict	Violent conflict probability score	0–1, positive	INFORM	25
	Terrorism risks	Terrorism index	0–10, positive	GTI	26
Technical risks T	Natural risks	Natural disasters	0–10, positive	INFORM	27
	Connected state	Infrastructure	0–10, positive	INFORM	28
		Road density	0–10, positive	INFORM	29
	Technical capacity	Coping capacity	0–10, positive	INFORM	30
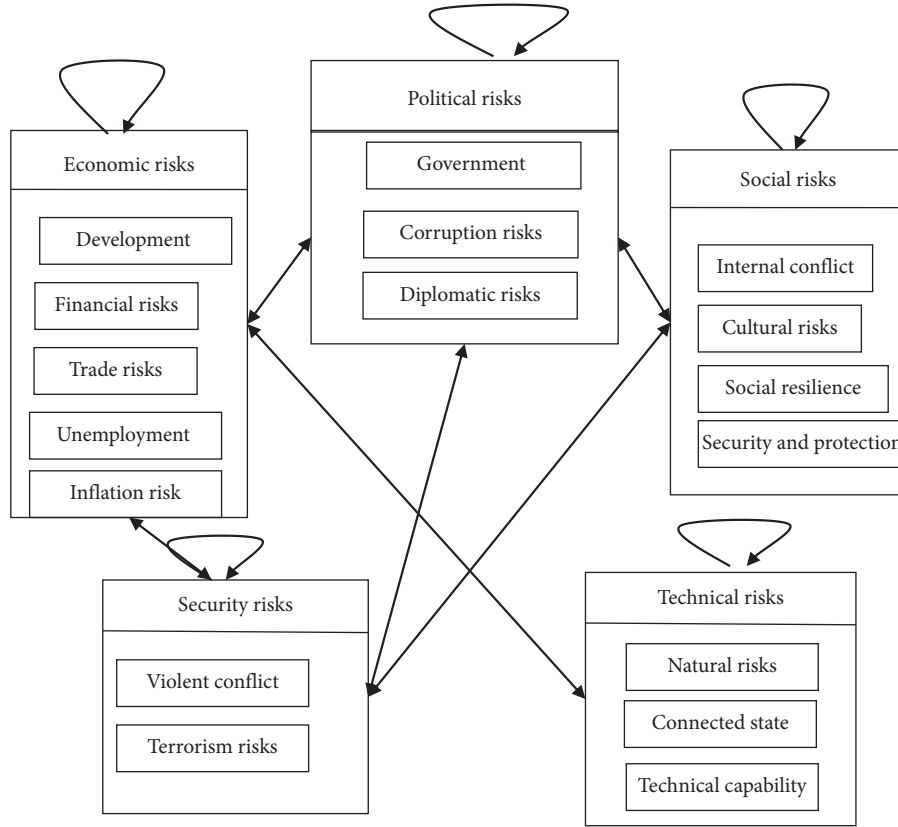
FIGURE 1: International transportation corridor's operational risk network structure.

$$O = \begin{pmatrix} P \\ E \\ S \\ X \\ T \end{pmatrix} = \begin{pmatrix} 0.41181 \\ 0.14149 \\ 0.12206 \\ 0.28657 \\ 0.03807 \end{pmatrix}. \tag{5}$$

Equation (5) represents that the weights of the first-level indicators, from top to bottom were the political risks, economic risks, social risks, security risks, and technical risks. Consider

$$P = \begin{pmatrix} P_1 \\ P_2 \\ P_3 \end{pmatrix} = \begin{pmatrix} 0.48984 \\ 0.20060 \\ 0.30956 \end{pmatrix}, \tag{6}$$

$$E = \begin{pmatrix} E_1 \\ E_2 \\ E_3 \\ E_4 \\ E_5 \end{pmatrix} = \begin{pmatrix} 0.34550 \\ 0.18886 \\ 0.29431 \\ 0.10399 \\ 0.06734 \end{pmatrix}, \tag{7}$$

$$S = \begin{pmatrix} S_1 \\ S_2 \\ S_3 \\ S_4 \end{pmatrix} = \begin{pmatrix} 0.59383 \\ 0.33443 \\ 0.05706 \\ 0.01468 \end{pmatrix}, \tag{8}$$

$$X = \begin{pmatrix} X_1 \\ X_2 \end{pmatrix} = \begin{pmatrix} 0.44080 \\ 0.55920 \end{pmatrix}, \tag{9}$$

$$T = \begin{pmatrix} T_1 \\ T_2 \\ T_3 \end{pmatrix} = \begin{pmatrix} 0.09315 \\ 0.10652 \\ 0.80033 \end{pmatrix}. \tag{10}$$

Equations (6)–(10) represent the weights of three levels of indicators: political risks, economic risks, social risks, security risks, and technical risks.

3. The Operational Risk Analysis of the China-Pakistan-Iran-Turkey International Transport Corridor

The Silk Road Economic Belt proposes to build three lines of international transport corridors on the Eurasian continent

in the northern, central, and southern direction. Once the three major international transport corridors were built up, it will resolve China's energy plight effectively and promote trade volume with the countries along the routes greatly. Taking the China-Pakistan-Iran-Turkey Corridor (CPITC, Figure 2) as an example, its operational risks from 2010 to 2019 were analyzed.

3.1. International Transport Corridor Planning of CPITC.
The China-Pakistan-Iran-Turkey International Transport Corridor, which starts in China and ends in Turkey, is an envisaged international strategic channel linking Asia and Europe. Specifically, it is an important corridor which has been grounded, as a concept, in the BRI. The construction of the China-Pakistan-Iran-Turkey International Corridor has internal driving forces and important strategic value [35]. The channel is based on the China-Pakistan Economic Corridor, expanded to Iran and Turkey, and can be built for a new Asia-Europe continental bridge. As an important skeleton of the Silk Road Economic Belt, this channel not only connects the Yangtze River Economic Belt with the new land and sea corridor in the south but also efficiently interconnects with Central Asia, South Asia, the Middle East, and Europe externally, so it is a strategic importance for promoting and implementing infrastructure connectivity in the Belt and Road Initiative. At present, China has established strategic (friendly) relationships with Pakistan, Turkey, and Iran, respectively. It is remarkable that, on March 27, 2021, China's foreign minister Wang Yi signed a comprehensive partnership agreement with Iran's foreign minister, Zariff for a period of 25 years, with contents including political, strategic, and economic aspects. The transportation infrastructure is connected on a certain basis among the four countries. At present, with the further progress of the China-Pakistan Economic Corridor, Pakistan's infrastructure and transport network are being modernized by leaps and bounds. Happily, the ITI railway connecting Istanbul, Teheran, Islamabad, will be resumed after 10-year breakup (mostly by security concerns and poor technique) and will intensify the trade contacts among the three countries to a great extent. The four countries are closely related at the political, economic, and Geo-level, and there are a wide range of interests among them.

The China-Pakistan-Iran-Turkey International Transport Corridor is also an important energy strategy channel. China is one of the world's largest energy consumers; the construction of CPITC may relieve the Malacca predicament and enhance China's energy security. Pakistan is an energy-deficient country with significant geographical location; the CPITC can not only satisfy its energy consumption but also boost its economy growing. As a cross-border energy country, Pakistan can obtain transit costs [36]. Iran has been rich in natural gas and crude oil, and its economy depends largely on exports of crude oil. Iran is an important node area along the Belt Road, known as the air corridor between east and west. However, Iran has suffered sanctions due to the Iranian nuclear issue. Through the construction of CPITC, Iran can set up an extensive network of energy pipelines and improve its regional security and economic development. Turkey stands in the center of Eurasia. As a corridor country, Guo and Huang [36] pointed that the construction of the CPITC will not only enable Turkey to expand the transportation of Iranian oil and gas resources to Europe but also increase oil and gas resources transport from North Africa, West Africa, and the Caspian Sea to Pakistan and China.

3.2. The Operational Risk Factors Analysis of CPITC.
The international transport corridor faces diversified risks during its planning, construction, and operation period [37]. The planning of CPITC stands across Asia and European continent, which will confront all kinds of risks from political, economic, security, and technical aspects (see Table 1). The CPITC faces diversified risks during the lifecycle of planning, construction, and operation (Figure 3); generally speaking, the fatal risk factor will be the political risks during the planning period. The coordination among the four countries will be extremely complex, and the process will be affected by extern intervention. The main risks during the construction period will be economic risk. As the infrastructure construction of a new international transport corridor needs a large amount of capital. However, the development foundation along the route is totally different. The dominant risk during the operation period may be the security risks and social risks. Terrorism, extremism, and relinquish have become a dominant threat to the operational safety of international transport corridors. Geo-traditional security risks and nontraditional security risks need special notice [38] (see Figure 3).

As we know, political stability is the key point for developing an international transport channel and has crucial impacts on its construction. During 2019, Pakistan got 3.33 percentile ranks in political stability and absence of violence/terrorism and had the lowest government effectiveness in the four countries. Meanwhile, Pakistan has dealt with its controlling of corruption unsatisfactory all the time; even the former president Asif Ali Zardari was arrested for corruption. Iran suffered poor regulatory quality with a percentile rank of 6.73, far below the other countries in CPITC, which may have bad impacts on the quality of the international transport corridor. Moreover, Iran got a low point on the indicator of political stability and absence of violence/terrorism, its percentile rank was just 6.19. Turkey tested better than Pakistan but was significantly inferior to China. Special attention needs to pay to local political stability and social security risks in Turkey as the government launched a large-scale antiterrorism operation in 2019. In general, Pakistan had the highest political risks for international transport corridor, Iran and Turkey had more prominent political risks in some measures, China has the lowest political risks with stable political system, highly government effectiveness, effective regulatory quality, and vigorous anticorruption in recent years (see Figure 4).

Economic risk is an important factor affecting international channels, as massive funds are needed during the construction and operation of CPITC. According to the five
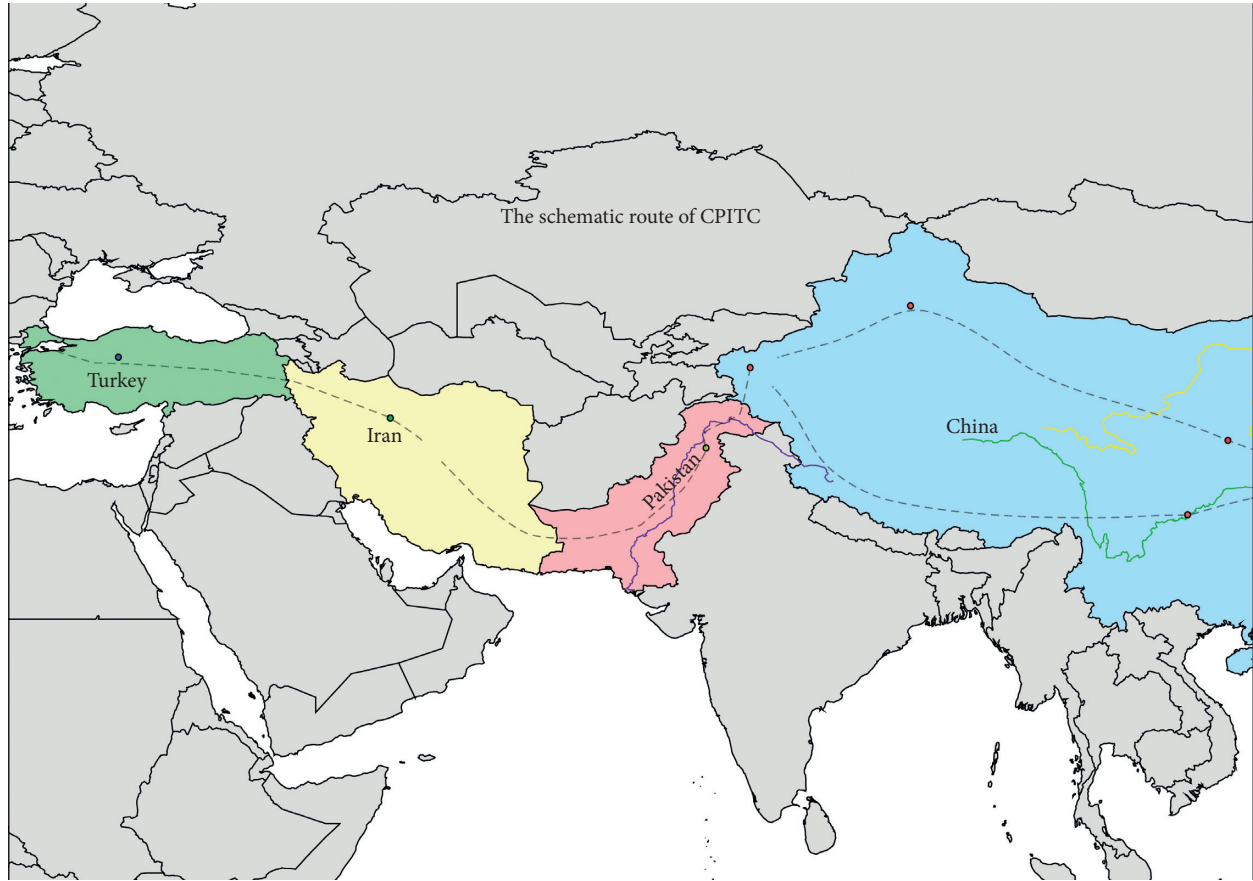
FIGURE 2: The schematic route of CPITC. Source: The Geography of Transportation Systems (by Jean-Paul Rodrigue, Claude Comtois, and Brian Slack).
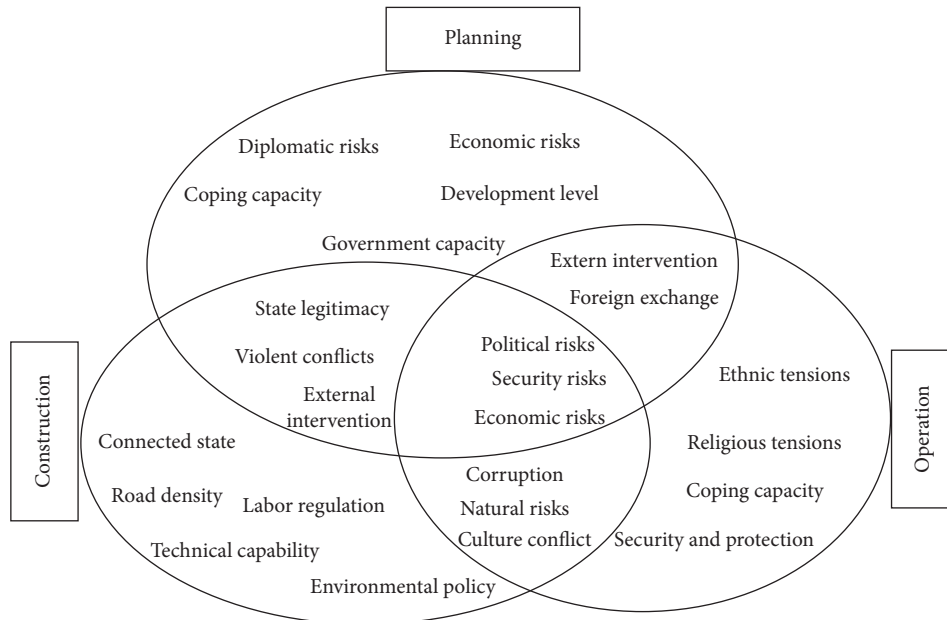

FIGURE 3: The risks during different periods of CPITC.

dimensions of economic risk, the economic disequilibrium index of the four countries is in a high level, which indicates that the economic development is uneven within the country, and the regional variations and urban and rural differences are huge (prominent). In terms of trade risks, Pakistan's foreign trade is still underdeveloped. Iran cannot
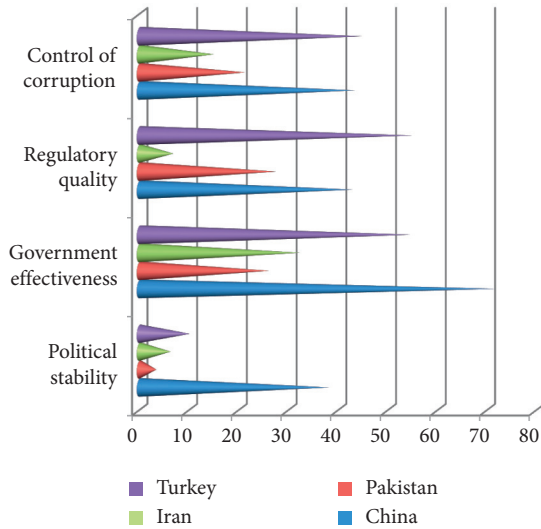
Figure 4: The political risks of four countries in 2019. Source: Kaufmann D.A. Kraay and Mastruzzi, the Worldwide Governance Indicators.
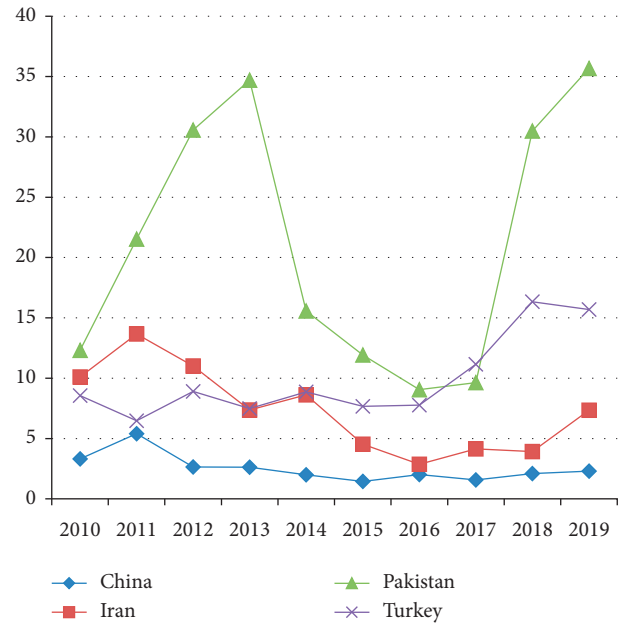

Figure 5: The inflation rate of four countries from 2010 to 2019. Source: World Economic Outlook (April 2021).

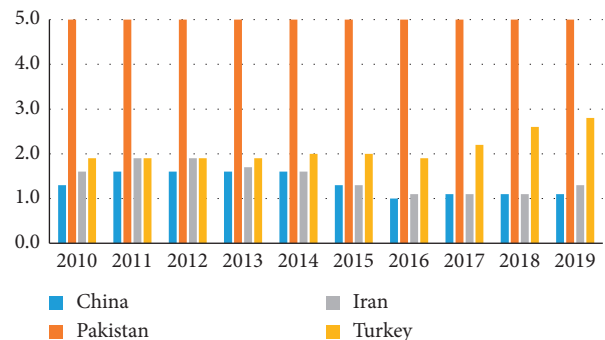Figure 6: Internal conflicts fought of four countries from 2010 to 2019. Source: https://www.visionofhumanity.org/maps/#/ (global peace index).

carry out normal foreign trade with the world due to the sanctions. Turkey's foreign trade continues to decline influenced by the economic crisis in recent years. However, China is now the world's second largest economy; its trade risks have been gradually reduced with the continuous improvement of its opening level since its accession to the WTO. Figure 5 depicts the inflation rate of four countries from 2010 to 2019. The figures show that inflation running beyond the world average inflation rate in the resent ten years for Iran, Pakistan, and Turkey. Only the rate of inflation in China has been maintained in a low level (less than 3%). In 2019, Iran's inflation even rose to 34.6 percent, far more than the other three countries, and its prices were spiraling out of control. Iran has suffered from a shrinking economy, a sliding currency due to high inflation. Meanwhile, unemployment remains stubbornly high in Iran. Overall, Iran has the highest economic risks among the four countries, Pakistan ranked the second, and Iran ranked the third, China has the lowest economic risk.

Social risk will directly affect the line selection of routes, labor source, and the operating environment, which need to pay continuous attention. As carriers of political communications, trade exchanges, and culture exchanges, the international corridors are affected by the changes of the social changes in a certain country [39], such as the internal conflicts and religious tension. And these factors will have long-term and intensive social influence for international channels. Data shows that the internal conflicts in Pakistan are severe. Pakistan has a tense ethnic relation and religious tension. Due to the Global peace index, Pakistan has a score of 5/5 (negative to the highest score, see Figure 6) on the internal conflicts in the past ten years, with civil, interstate, one-sided, and nonstate conflicts fought within the country all the time. In addition, Pakistan, Iran, and Turkey have different religious sect, and there is a rift among the various factions, and the religious risk of the three countries will maintain in a high level. Pakistan, for example, there has been a fierce fight between Shias and Sunnis as an Islamic state. Iran faces serious separatism in recent years, and the religion has a great influence on normal social life.

Besides, Iran has the worst public security situation among the four countries, with its crime index score of 49.52 in 2019. Pakistan ranked the second, with a crime score of 42.61. Turkey ranked the third, with a crime score of 39.66. China had the best security environment, with a core of only 30.04 (see Figure 7). As the only Muslim country, Iran has the largest social gap from China in national conditions, customs, regulation rules, history, and culture distance, which are crucial risks that the CPITC have to consider.

Security risk is another crucial factor which may break off the international transport corridor directly. Nowadays, terrorism has become a worldwide problem and threat to the local economic and social development of countries along
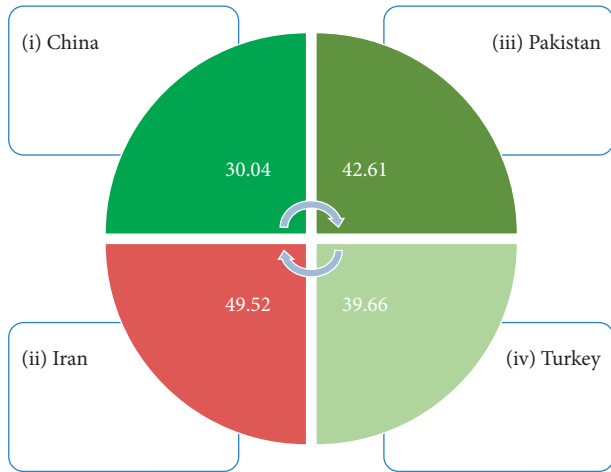
FIGURE 7: Crime index of four countries in 2019. Source: https://www.numbeo.com/crime/country_result.jsp? (NUMBEO).

FIGURE 8: Global terrorism index of four countries from 2010 to 2019. Source: https://www.visionofhumanity.org/maps/global-terrorism-index/#/ (GTI).

FIGURE 9: Inform global risk index of four countries in 2019. Source: https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk (European Commission).

the route. The CPITC faces serious terrorism threat for a long time (see Figure 8). Pakistan is the fifth least peaceful countries in the world with a score of 7.889 in Global Peace index in 2019.279 terrorist attacks occurring this year, which lead to 300 fatalities, 654 injuries, and nearly 86 property damage loss. Turkey got a 6.11 overall score of Global Terrorism Index and ranked 18th among 163 countries. There were 45 terrorist attacks during 2019, which caused 40 fatalities, 171 injuries, and 15 properties loss. Iran ranked 46 among the world, with a terrorism index of 4.2.3 fatalities and 3 injuries being lost due to 4 terrorist attacks. China has the lowest terrorism risk among the four countries, with an overall score of 3.6 terrorism index, and ranked 53. During 2019, there were 12 incidents occurring with 0 fatalities, just 12 injuries, and 1 property lost.

The technical risks of the international transport corridor can be divided into natural hazards, technical ability (copping capacity) risk, and connectivity risk. Technical risks can occur and run in a certain extent, and in some cases, it can lead to the stagnation and interruption. The natural risk index in the CPICT is in a high level (see Figure 9); there are earthquake, flood, tsunami, drought, and epidemic disasters along the route. Specially, Turkey's hazards and exposure index is much higher than the other three countries (HA = 7.9); measures need to be carried out to prevent the natural hazards early in the planning period of the corridor. Considering the infrastructure condition, the Pakistan has the lowest physical infrastructure and communication and lack of copping capacity. Besides, Iran's technical ability is backward as the terrible economy, and Iran's CC (lack of coping capacity) index ranked the second, with a score of 4.5. In general, Pakistan has the highest technical risk among the four countries, followed by Iran and Turkey, and China's technical risk is the lowest as its strong infrastructure capacity.

3.3. The Results of Operational Risk of CPITC.

The relevant data for 2010–2019 from the four countries along the China-Pakistan-Iran-Turkey International Transport Corridor
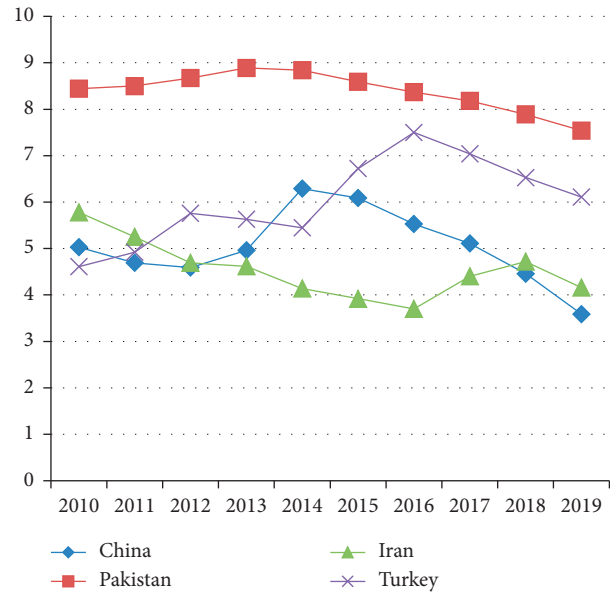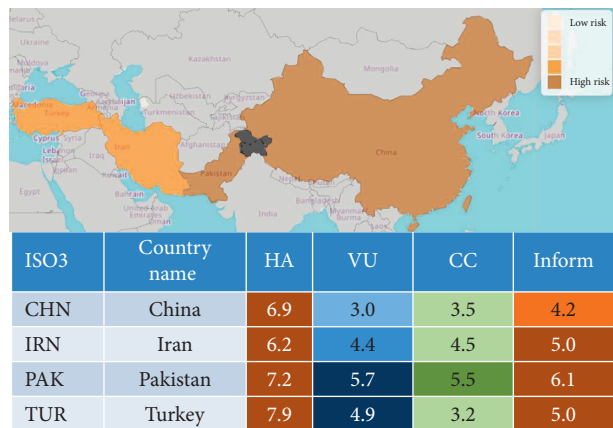
were selected to represent the specific values. Using the evaluation model of international transport corridors' operational risks established in Section 2, the operational risks of the China-Pakistan-Iran-Turkey International Transport Corridor were calculated and analyzed.

3.3.1. The Operational Risk Index of CPITC.

According to the China-Pakistan-Iran-Turkey International Transport Corridor operational risk index (ORI) in 2019 (Table 2), the results showed a big difference. The Pakistan segment has the highest operational risk; the next culprit is Turkey, followed by Iran, and the China section has the lowest operation risk index, which is coincided with the fact. Countries are facing different national conditions and development levels along the corridor: Pakistan has suffered from political instability,

TABLE 2: The operational risk index of CPITC (2019).

	Political risks	Economic risks	Social risks	Security risks	Technical risks	ORI
China	33.7137	25.1930	14.7644	67.8063	34.2445	41.6853
Pakistan	60.6537	29.3560	27.0205	88.0594	55.7410	65.8867
Iran	41.2548	33.2416	34.4229	60.7504	44.6244	47.2022
Turkey	44.2655	28.4819	25.7764	81.6845	33.2167	52.2780

military affairs, political party disputes, sharp social contradictions, terrorist attacks, and being vulnerable to geopolitical influence. Turkey has been trapped in the Kurdish issue and reflected in the Middle East conflicts and disputes deeply. Iran is beset by severe economic problems under US sanctions, with high inflation and high unemployment rates. As the world's second largest economy, China enjoys political stability and national prosperity; its operational risk index will decrease with the further development of One Belt and One Road strategy, accompanied by international status and influence rising in the past few years.

Although promoting and implementing of CPITC may boot the trade and commerce, the operational risk index shows that CPITC still faces challenges and difficulties. It is not easy to reach a consensus for the four countries. So, it is important to enhance unilateral and multilateral communication (high-level exchanges) to reach political trust, boost the economic and trade cooperation to upgrade economic power, increase the people-to-people exchanges to bring friendly exchanges between the people, and lay a solid foundation for international transport corridor's lifecycle of planning, construction, and operation.

3.3.2. The Suboperational Risk Index of CPITC. According to the operational risk index of CPITC in 2019, due to poor government capacity, corruption and diplomacy, serious terrorism, underdeveloped infrastructure, and poor response capacity, Pakistan ranked the highest in political, security, and technological risks. Besides, Pakistan has long been trapped in elected government instability and widespread corruption. The military has also been a pivotal player in Pakistani politics, and there have been serious dispute between the central government and the locals. Furthermore, Pakistan has been intervened geopolitically by the United States, India, and other extraterritorial powers, even breaking out fierce military conflict in Kashmir recently between India and Pakistan. Iran ranks first in terms of economic and social risk. Economically, the US tore up the deal and imposed sanctions against Iran again, not only banning its oil exports, but also restricting Iran's politic activities, cultural exchange, and military development in all aspects. The sanctions led to a deterioration in Iran's economy by −9.45% in 2019 from the IMF report, with its inflation rate creeping up to 35 percent, unemployment rate reaching up to 16.78%. In terms of social risks, Iran faces a serious separatist risk and internal conflicts, as a country led by the Shiites of Islam; Iran's religious forces have a great influence on the social life. Furthermore, Iran has the most differences from China.

The security risks are higher than the other operational risks, and political risks rank second in horizontal line (Figure 10). As economic integration and globalization quicken, the number of large conflicts appears to decline slightly, but the current nontraditional security risks such as terrorism, religious extremism, and ethnic separatism are becoming prominent factors increasingly. The four counties are suffering from various types of security risks. In terms of political risks, the government's ability, corruption, inefficient, military intervention, and external intervention will exacerbate the riskiness, and this problem is more prominent in Pakistan and Turkey.

3.3.3. Country's Key Risks of CPITC. Security risks are the key risks in the Chinese section of the CPITC, which mainly concentrates in Xinjiang province. Xinjiang is the region of the multiethnic groups and has been influenced by Islamic culture. Terrorist organization such as the east Turkistan Islamic movement, East Turkestan liberation organization incited ethnic hatred, and religious fanaticism in Xinjiang. The three forces planned and implemented a series of violent terrorist incidents in Xinjiang since in the early 1990s, a large number of innocent people were killed, and hundreds of police officers died on duty, and property losses were immeasurable. For example, in July 5, 2009, a serious violent crime happened in Urumqi, more than 1,700 people were injured and 197 died. In recent years, the Chinese government has taken firm and strict measures to against violent terrorist crimes and promoted the work of eradicating extremism, in accordance with developing the economy. The society is showing an Ethnic unity and social harmony. Security risks are effectively controlled. Moreover, frequent natural disasters, earthquakes, mudslides, and other geological disasters have an adverse effect on the international transport corridor in Chinese section.

Pakistan is at the top list of operational risk index. Attention needs to be paid to all kinds of risks during the stage of planning, construction, and operation. Specifically, political and security risks have been particularly acute in the Pakistani section [40]. Nowadays, the institutionalization of political parties in Pakistan is still in a low level, with personalization, family-based, regional characteristics, and factions as its main characters. The loose party organization, lag running mechanism, and weakly social foundation had hindered the functioning from its democratic institutions [41]. During the PPP tenure, the Benazia Bhutto and Zardari government made a great effort on boosting the economic development, introducing foreign investment, improving the social security system, promoting economic liberalization and political democratization, and especially making
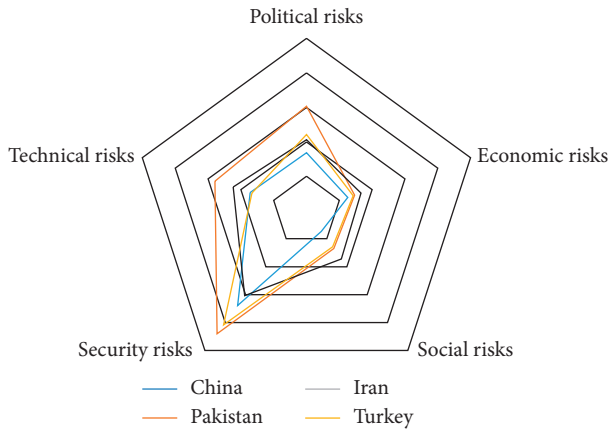
FIGURE 10: The suboperational risks of CPITC (2019).

great achievements in the aspect of improving the status of women. However, during this period, Pakistan had been riddled with serious corruption, acute religious conflicts, and frequent safety issues, which lead to high political risk and secure risk. Meanwhile, the economy suffered a great stagflation with a high inflation rate and continued economic downturn due to the bad economy policy. During the PML (N) tenure, Sharif had more governing experience. On the one hand, he took stronger and harsher measures to develop the economy and improve the people's wellbeing and tried to maintain social stability as much as possible. Significantly, he promoted the development of the China-Pakistan Economic Corridor vigorously during his third stage of administration. On the other hand, he started a nuclear test race with India and broke the relationship with the military (in his second term of prime minister). At the same time, the huge difference in development between provinces increased risk of conflicts. Besides, frequent corruption incidents have greatly damaged the credibility of the government or the ruling party. At the end of July 2018, the winning of the PTI has created a pioneer in the history of Pakistan. It ended the historical situation of the PML (N) and PPP bipartisan rotation in power. Pakistan first appeared a situation of tripartite confrontation among the PTI, PPP, and PML (N). Prime minister Imran Khan carried out "anticorruption" as his basic platforms and "antifamily rule" as his banner. Now, he is a popular premier and gained unprecedented public approval. Imran Khan's political vision of a "new Pakistan" has played an important role in stimulating the majority of people and especially had a strong charisma to the young people. According to the poll, the PTI was polling at 72% among 18 to 29 and 68% of voters aged 30 to 44 support the PTI's guidelines.

In the Iranian segment, Iran suffers from fierce economic risks and social risks. Besides, its security risks have remained stubbornly high. In particular, the deterioration of relations with western countries led by the United States is prone to extreme events that bring greater risk of war and political risks for Iran. Turkey's operational risk indicators are slightly better than Iran and Pakistan. However, the security risks require special attention in the Turkish segment due to the Kurdish issue. Turkey has even repeatedly

violated the sovereignty of Iraq and Syria by launching cross-border attacks against Kurdish forces, which had led to an escalation of regional conflicts, casting a significant security risk.

3.3.4. The Operational Risks' Trends of CPITC. According to the operational risks' trends of CPITC (Figure 11), the operational risks of the Chinese segment have been declining slowly since 2010. By contrast, Pakistan's operational risks have been in a high level abidingly, with scores above 60, far higher than the other three countries. The overall operational risk in Iran is on the rise, with the overall deterioration in US-Iranian relations changed; for the moment at least, there is no sign of easing. At present, the Middle East has formed an anti-Iranian alliance centered by the United States, Saudi Arabia, and Israel. Iran's economic development prospect is not optimistic in the future. Iran and the United States are even more close to breaking war in beginning of the year 2020 when the United States assassinated a senior Iranian official named Qasem Soleimani. The operational risk index in Turkey shows a slow rising trend in the future. While the political and social risks in Turkey remain relatively stable, security risks show creeping, and the economy growth is at risk of deterioration. Since 2018, the US has lifted sanctions against Turkey and raised tariffs on imports of steel and aluminum, leading to a complete deterioration of Turkey's economy. In 2019, its economy showed even more negative growth. In addition, the security risks in Turkey are in a high level, as the Turkish government has stepped up its fight against Kurdish forces; its safety risks show an upward trend in recent years. Furthermore, as the complex situation of the world economy and the adverse impact of the rising of trade protectionism, the operational risk of CPITC showed an increasing tendency in 2019.

3.4. The Recommendations for the Operational Risk Control of CPITC

3.4.1. Strengthening International Cooperation and Enhancing Political Mutual Trust. It is essential for the four governments along the CPITC to strengthen policy communication and mechanism construction and enhance security and political consensus and mutual trust continuously. The government should strengthen bilateral and multilateral cooperation within the framework of the Belt and Road and strengthen the cooperation in terms of infrastructure connectivity, international economic cooperation, security and counterterrorism, economic and social risk prevention, and combating extremist forces closely, to reduce the adverse effects of political risks, economic risks, social risks, and security risks.

Specifically, the four countries should establish a special deliberation and coordination agency on facility connectivity, set up the main organization for the construction and operation of international transport corridors, explore the coordination mechanism for transportation, and cooperate in such areas as construction mode, transport organization,
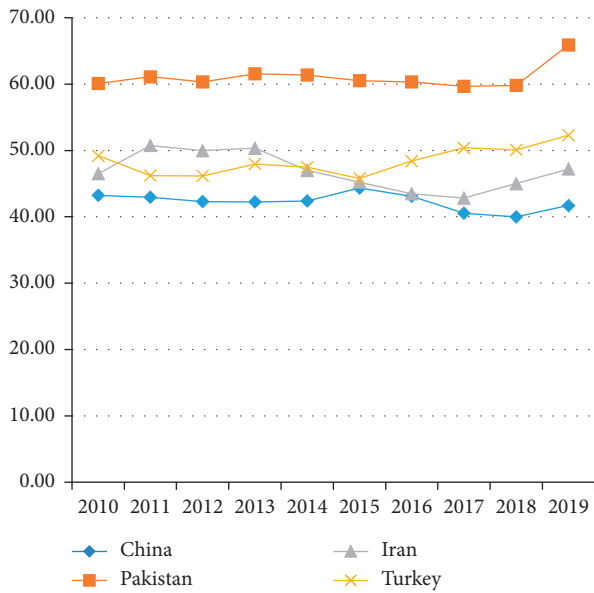
FIGURE 11: The operational risk trends to CPITC (2010–2019).

and security control, escorting for the safe and smooth operation of international transport channels together.

3.4.2. Strengthening Risk Response Capacity Building and Enhancing Key Risk Control. Countries along the CPITC should implement special prevention for the weakest links and key risks specifically. We should avoid the lines that natural disasters may occur when planning, concentrating on international disaster mitigation, cooperation, strength, the emergency response capacity building, remedy, and the shortcomings to reduce the adverse impacts. For the key risks, it is crucial to establish an efficacious and rational emergent plan and to do ordinary drills to prevent the emergencies, comply with the laws of the host country, and integrate into the local environment forwardly.

In practice, we should pay special attention to the strategic security risks of the channel brought about by the big country game and geopolitical conflict and the risk of "political security" caused by the political instability, the risk of "economic security" arising from the adjustment of national policies and the change of cooperative policy, the risk of "personal security" caused by extremist forces and violent terrorist attacks, and the risk of "social security" arising from labor, environmental protection, aborigine group, legal compliance, health and safety, and so on.

3.4.3. Strengthening Dynamic Risk Research and Building Information Sharing System and Early Warning Platform. With the changes of the international situation and the intervention of extraterritorial forces, the strategic China-Pakistan-Turkey International Transport Corridor is prone to all kinds of conflicts and emergencies along the channel, which may occur sporadically and dynamically. Therefore, it is necessary to strengthen the risk study along the channel dynamically, grasping the political, economic, social, and

security situation of countries along the route in a timely manner, establishing dynamic rating and early warning mechanisms, adjusting the construction and operation strategies of the channel timely, and making contingency plans so as to improve the ability to reduce the operational risks.

Specifically, dynamic risk monitoring system should be carried out for countries along the strategic corridor of CPITC, the corresponding monitoring report and risk early warning reports can be issued in a timely manner, and public service platforms for information sharing and early warning information system can be constructed. For sudden and significant strategic risks, it is critical to focus on the situation and avoid potential conflict areas as much as possible during the period of channel planning and construction. Contingency plans for risk response should be established, and corresponding conflict events were timely, and necessary measures must be taken to minimize the negative impacts on channel operation and reduce casualties and property damage.

4. Discussion and Conclusions

The operation of international transport corridors is affected by political, economic, social, security, and technical risks. Specifically, the political risks' influences are fatal. The economic risks' influences are significant which may affect the fund of construction. The safety risks have a vital influence on the construction and normal operation. The social risks' influences are important. The technical risks' influences are slight which have less impact on international transportation channels with the progress of human technology. However, there are many operational risks along the China-Pakistan-Iran-Turkey International Transport Corridor. Data shows that the Pakistan section has the highest operational risk index. Pakistan has been trapped in severe political risks and security risks in recent years, and its operational risks will be consistently high in the future. Turkey lies second in the operational risk index. Turkey suffers from severe security, and the security risks of the Kurdish issue are on the rise. The Iranian section is trapped by economic risk and social risk, and the operational risks in Iran will show an upward trend. China has the lowest operation risk index, and its operational risk index will decrease in the foreseeable future.

It is necessary to increase bilateral and multilateral communication and cooperation at the national level for the counties along international transport corridors to enhance political mutual trust. International coordination mechanisms should be built up continuously, internal capacity building for risk response needs to be intensified, severe problems and key risks such as nontraditional security risks require urgent attention, information sharing systems, and early warning platform should be established; risk early warning reports can be released so as to ensure international transport corridors' operational safety.

Data Availability

Quantitative data on risk factors were derived from authoritative databases such as the World Bank, the

International Monetary Fund (IMF), Bloomberg, the World Governance Index (WGI), the Global Peace Index (GPI), Inform, and the International Guide to National Risks.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Authors' Contributions

The manuscript was approved by all authors for publication.

Acknowledgments

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