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Research Article

China-Laos Economic and Trade Cooperation and Construction of Sustainable Energy Cargo Channel under the Background of "One Belt, One Road"

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With the increasing import volume of China's oil and natural gas, the structure of China's energy supply chain (ESC) has become more and more complex. How to use the "Belt and Road" (OBOR) layout to promote China's regional energy cooperation and ensure China's energy security has become an important international issue facing China. This paper constructs an ESC network model in the context of the OBOR, and finds out the position of China in this network model. This paper also finds out the role law of each risk influencing factor, analyzes the degree of its influence, and puts forward some suggestions on the risk management of ESC according to the analysis results. This paper proposes to use decision tree algorithm to guide the development and construction of Sino-Lao economic and trade cooperation, which will help analyze and help the construction and research of Sino-Lao economic and trade cooperation and sustainable energy freight corridor. Based on the energy cooperation between China and the countries along the "Belt and Road," this paper analyzes the network structure of energy cooperation under the "Belt and Road" background based on the small-world network theory. This paper analyzes the important role of core countries in the ESC through the analysis of the basic parameters of the small-world network, the efficiency of energy cooperation, and the stability of energy cooperation. According to the value of each vertex degree obtained by the calculation formula of entropy value, the entropy value of the ESC network structure under the background of OBOR can be obtained as 2.408. It calculates that the maximum and minimum entropy of the ESC network structure at this time are 3.09 and 2.21 respectively.

1. Introduction

One Belt and One Road is the abbreviation of Silk Road Economic Belt and twenty-first Century Maritime Silk Road, relying on the established bilateral and multilateral mechanisms between China and the countries concerned, with the help of established and proven regional cooperation platforms, the Belt and Road aims to borrow the historical symbols of the ancient Silk Road, hold high the banner of peaceful development, actively develop economic partnerships with The Belt and Road aims to borrow the historical symbol of the ancient Silk Road, hold high the banner of peaceful development, actively develop economic partnerships with countries along the route, and jointly build a community of interests, destiny and responsibility with mutual political trust, economic integration and cultural tolerance. In the regions along the "Belt and Road," the United States, Russia, and India have greater influence and have extensive interests in the region. In the era of economic globalization, the "Belt and Road" cooperation promoted by China will more or less compete and conflict with the interests of the above three countries. The security situation in some of these countries is even worsening. All of these potential dangers may cause disruption of the ESC in the context of China's "One Belt, One Road" (OBOR) initiative, bringing risks to China's energy supply. At present, although all circles of Laos and China have initially achieved certain results in the research on the issue of the "Belt and Road Initiative" and the "Development of Laos-China Economic and Trade Relations under the Cooperation Framework of

the ASEAN Free Trade Area," the relevant research results also play an important role in guiding the development of practical activities. However, due to the fact that the research on the development of Laos-China economic and trade relations under the framework of the "Belt and Road" and ASEAN Free Trade Area cooperation between Laos and China has been carried out relatively late, and the new environment, new technologies and new strategies have changed with the times. The emergence of opportunities has made the research on economic and trade cooperation between Laos and China more complicated. In this context, there are still many things that can be further researched on the development of Laos-China economic and trade relations under the framework of the "Belt and Road" and ASEAN Free Trade Area cooperation., the relevant research results also need to be continuously condensed and sublimated, so as to form a more systematic research system on the development of economic and trade relations between Laos and China under the cooperation framework of the "Belt and Road" and the ASEAN Free Trade Area. Therefore, for the "Belt and Road" and ASEAN The discussion on the development of Laos-China economic and trade relations under the framework of free trade zone cooperation is a supplement and extension to the existing theoretical research.

Research on ESC risk is not only an important part of energy management, but also an important part of supply chain risk management. In-depth research on this issue will help to make up for the lack of ESC management theory. It also helps to further improve the risk management system of the relevant participants in the ESC network. It is conducive to the establishment and improvement of China's ESC network under the background of OBOR, and it can also provide reference for how China should conduct energy cooperation.

Affected by the differences in research paradigms, ideas and actual situations, the existing research still has the following problems: In terms of research methods and ideas, the development of Laos-China economic and trade relations under the existing "Belt and Road" and ASEAN Free Trade Area cooperation framework The research lacks independent and systematic characteristic research methods and ideas, and the methods adopted by the academic circles are mostly quoted from other disciplines. Although these cited research methods and ideas have been proved to have a certain role and scientificity in the original disciplines, whether these research methods and ideas are in the Laos-China economic and trade relations under the framework of the "Belt and Road" and ASEAN Free Trade Area cooperation The field of development is also feasible and scientific, and it is worthy of further discussion. The innovation of this paper: (1) It applies complex system theory to supply chain risk management, and builds an energy cooperation network between China and countries along the OBOR on the basis of existing research. (2) It constructs a system dynamics model of the risk factors of the ESC under the background of the OBOR. It studies the interaction between the risk factors of the ESC and finds out the risk factors that have a greater impact on the ESC. It also puts forward relevant suggestions

on the risk management of ESC in the context of OBOR. This article examines the impact of several major aspects of economic and trade cooperation between China and Laos on the economic growth of Laos separately, providing a new research perspective.

2. Related Work

The 19th National Congress of the Communist Party of China put forward the requirements of energy reform, and further promoting energy reform is also an inevitable way to solve the contradictions between energy, environment and economy. The OBOR international energy cooperation project is the trend of energy reform. Cui research shows that the PPP model, with its unique advantages, leads the cooperation and complementation of government capital and social capital, and is the most powerful support for the OBOR international energy cooperation projects. He analyzed the rationality of the application of Financing and Project Management Models (PPP) mode in international energy cooperation projects, and introduced the implementation steps of PPP mode in international energy cooperation projects. He identified possible political risks, as well as completion risks and environmental protection risks in the operation of international energy cooperation projects [1]. With the increase of China's energy demand and the external dependence of China's economic development on China, China's oil supply continues to rise. For the foreseeable future, China's oil trade will remain centered on imports. In terms of strategy, Guo et al. has established a trade gravity model for China's oil import trade. Through multiple linear regression analysis and empirical research, he obtained the key elements of real estate development in China. He summarized China's oil import trade, and also put forward a proposal to promote China's oil trade with other countries in the world on one road [2]. The Solangi et al. study highlights the scope and underlying objectives of the Belt and Road strategy and its implications for socio-economic development in China and Pakistan. Finally, he concludes the work by discussing the current status of Political Economy of Communication (PEC) and future opportunities for success [3]. Hussain et al. investigates the impact of climate change potential and geographic factors on transport infrastructure. It covers 65 Belt and Road countries geographically. Using a panel dataset obtained from 2001 to 2018, he employs suitable econometric techniques (such as FA, OLS, Heck-man, and GMM) to investigate whether climate change potential or geographic factors significantly affect transport infrastructure (roads, railways and ports). The results show that both climate change potential and geographic factors (especially land distance) negatively impact transport infrastructure. At the same time, its impact has significantly reduced the quality of transportation infrastructure by about 16% [4]. Tulokhonov et al. presented the project to create the North Asia Atlas of Sustainable Development. As a basic cartographic work, it provides a comprehensive map of the territory. The technical basis of the Atlas is the geographic information system for sustainable development of North Asia [5]. China's "One

Belt, One Road" (OBOR) initiative is an important tool in its strategy to maintain Chinese control and political stability, and to drive China's troubled economy. The concept of One Belt One Road is ambitious but ambiguous and fits perfectly with the traditional Chinese model. In the context of "hide your strengths and bide your time," a question has been raised [6]. However, the above research pays more attention to the development strategy of China-Laos economy and trade, but does not conduct in-depth analysis of the Belt and Road policy, resulting in the lack of combination of the two and the inability to give full play to their advantages.

3. Channel Construction Related Algorithms

This paper studies the issues of economic and trade cooperation between China and Laos under the background of the current "Belt and Road" and ASEAN Free Trade Area Cooperation Framework. The theoretical and practical significance of carrying out the research is explained. Then, the methods and paths that need to be used in this research are discussed, so as to provide basic preparation for the follow-up research. Then, the cooperation with the "Belt and Road" and the ASEAN Free Trade Area will be discussed. This paper summarizes and analyzes the research results of domestic and foreign scholars related to the research content of Laos-China Economic and Trade Relations under the Framework, and identifies the merits and deficiencies of existing research, so as to form a useful experience and reference for this study. Second, an overview of the relevant theories, that is, to explain the theories related to the research content of this paper, so as to provide basic support for subsequent research.

3.1. One Belt One Road. Energy cooperation is an important part of the OBOR construction. China's active promotion of energy cooperation under the OBOR initiative will help deepen international energy cooperation, build a new international energy order and rules, and promote the development of the international economic landscape [7]. The Belt and Road application areas are shown in Figure 1.

As shown in Figure 1, in the next ten years, there are five key areas under the Belt and Road Initiative with the greatest development potential and the highest participation of private enterprises. These are transport, telecommunications, utilities, digital infrastructure, renewable and clean energy. The Belt and Road concept is shown in Figure 2.

As shown in Figure 2, the key to the Belt and Road is to do a good job of "connecting" articles. The Belt and Road Initiative is an open and inclusive regional cooperation initiative, and is resistant to a non-exclusive and closed Chinese coterie. Today's world is an open world, openness brings progress, and closure leads to backwardness. China believes that only by opening up can we discover opportunities, seize and make good use of them, and take the initiative to create opportunities, in order to achieve our national goals. The "Belt and Road" initiative is to turn the world's opportunities into China's opportunities, and China's opportunities into the world's opportunities. It is

based on this perception and vision. The Belt and Road is open-oriented, and hopes to promote the orderly and free flow of economic factors, efficient allocation of resources, and in-depth market integration by strengthening the interconnection and construction of infrastructure such as transportation, energy, and networks, and to develop a wider, higher-level, deeper-level development. to build an open, inclusive, balanced, and inclusive regional economic cooperation structure to solve the problems of economic growth and balance. This means that Belt-Road is a collaborative initiative of diversity, openness and inclusiveness. It can be said that the openness and inclusiveness of the Belt and Road Initiative is a prominent feature that distinguishes it from other regional economic initiatives.

3.2. The Belt and Road Initiative and ESC. Regarding the research on China's OBOR and ESC, firstly, the relevant literature reports on CNKI were sorted out and analyzed by citespace software. Among them, the core search "China-Laos trade" is used to obtain literature, and images are constructed based on recently published articles. This is mainly for literature research to grasp the hotspots and frontier directions of the OBOR and energy supply research from a global perspective. The results are shown in Figure 3.

The size of the keyword in Figure 3 indicates the number of times it has been researched, and the larger the keyword, the more times it has been researched. Edges in the graph represent connections between keywords. If there is an edge between the keywords, it means that scholars have conducted research on these two keywords at the same time and have relevant literature support. In mathematics, physics and sociology, small-world network is a type of mathematical graph in which most of the nodes are not adjacent to each other, But most nodes can be reached by a few steps from any other point. If the dots in a small-world network represent a person, and the connecting lines represent people-to-people acquaintances, the small-world network can reflect the small-world phenomenon that strangers are connected by people who know each other. As can be seen from Figure 3, the main keywords of research on the Belt and Road are the OBOR initiative, "energy cooperation," "energy security," and "countries along the route." Its main keywords in the research of ESC are "international energy cooperation," "oil and gas cooperation," "energy channel," "supply chain" and so on. These point out the direction for the research of this paper, and show that the research on the ESC of the OBOR is a hot spot and has certain feasibility.

If each country is defined as a vertex, and the energy cooperation between two countries is regarded as an edge, and these points and edges are used to describe the relationship network of the ESC, this virtual network can be simplified into a small-world network structure. Figure 4 shows the energy supply network diagram drawn according to the energy cooperation status of some countries along the OBOR in recent years.

Figure 4 is an energy supply network diagram drawn according to the energy cooperation status of some countries along the OBOR in recent years. It can be seen from the
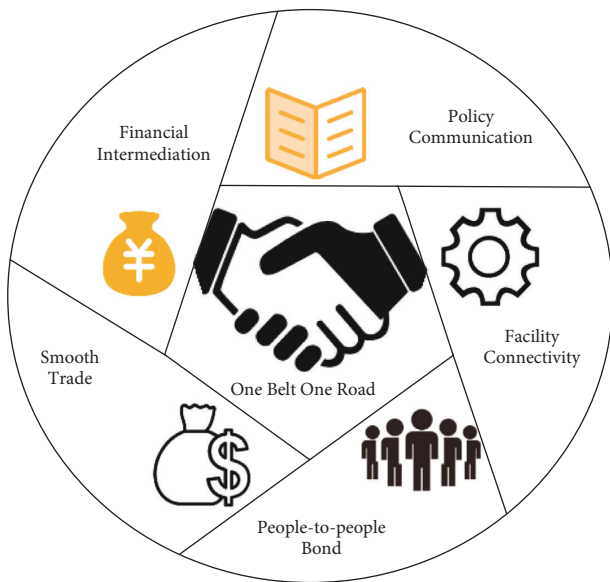
FIGURE 1: Belt and road application areas.

FIGURE 2: The belt and road concept.

figure that China has energy cooperation with many countries along the route. According to the theoretical basis of the small-world network model, several basic characteristic statistical parameters of the small-world network can be obtained. Its definition and calculation method are as follows:

(1) Node N: Each country or region participating in energy cooperation is a node of the ESC network.

(2) Side M: The energy cooperation (energy flow, technology exchange, etc.) of various countries is the side of the supply chain network.

(3) The degree k_i of a node: The number of edges that a node connects to other nodes is the degree of the node.

(4) Average degree K: The average of the number of edges connecting any two vertices along the shortest path.

$$k = \frac{1}{n} \sum_{i=1}^{n} k_i. \tag{1}$$

(5) Vertex degree I_i: It refers to the relative index of the degree value of each node in the supply chain, reflecting its importance in the supply chain network. The greater the vertex degree, the more important its position in the supply chain network is.

$$I_i = k_i / \sum_{i=1}^{N} k_i. \tag{2}$$

There are two parameters to evaluate the efficiency of energy cooperation, one is the average path length; the other is the average efficiency of the network.

(1) Average path length L: It is the average of the number of edges connecting any two vertices along the shortest path. The longer the average path length, the more cooperative relations between supply chains, and the worse the operation efficiency of the entire supply chain. Its calculation formula is as follows:

$$L = \frac{1}{N(N+1)/2} \sum d_{ij}, \tag{3}$$

where d_{ij} represents the shortest distance between node i and node j, that is, the network shortest path
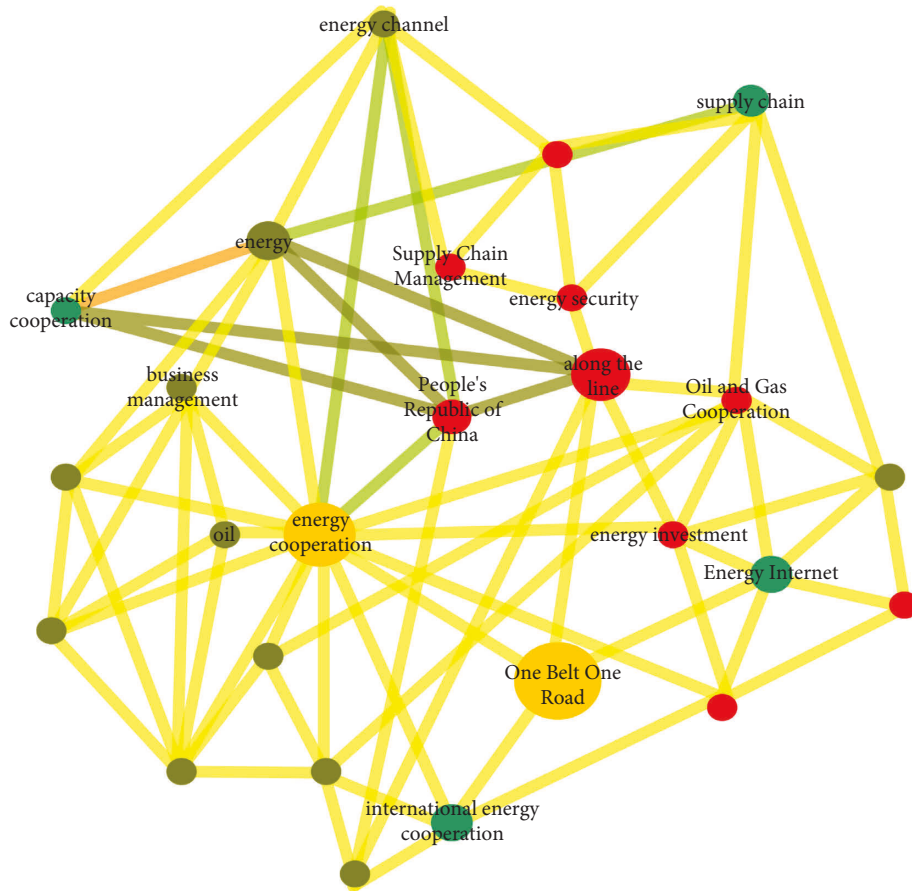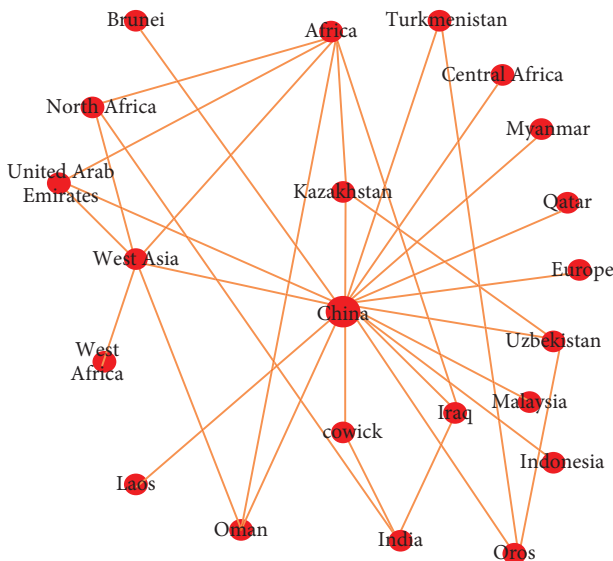
FIGURE 3: Literature analysis diagram.

FIGURE 4: OBOR energy cooperation network map.

matrix. For the entire supply chain network, the average path length represents the number of times that any node in the supply chain needs to pass through other nodes [8]. That is to say, the longer the

average path is, the more nodes it experiences when energy cooperation occurs, and the less risk each node takes [9, 10].

(2) The average efficiency E of the network: It assumes that each node in the network simultaneously propagates information to its neighbors. At this time, the rate of information transfer is inversely proportional to the distance between nodes. The greater the distance between nodes, the slower the transfer rate. Therefore the efficiency between point i and point j can be defined as $E = 1/dy$. From this, the efficiency of the network can be deduced as:

$$E(G) = \frac{1}{n \cdot (N-1)} \sum_{i,j} \left(1/d_{ij} \right). \tag{4}$$

When the vertex degree of each node is different, that is, there are a small number of core nodes and a large number of terminal nodes in the supply chain supply chain network. The ESC network at this time has a small-world characteristic, and it is said that the supply chain network at this time is "orderly" [11, 12]. The measure of the orderliness of the supply chain network is the structural entropy of the supply chain network, and its calculation formula is as follows:

$$H(G) = -\frac{N}{i=1}I_i \ln I_i. \tag{5}$$

When the importance of each node in the supply chain is equal, that is, when there is no core enterprise, there is I = 1/N, the network structure entropy is that the communication system provides services to the business needs through the channel, so the set of interactive communication at each moment (slot), which constitutes the events of the communication network, and the network structure entropy H takes the maximum value at this time [13].

$$H(0) = -\frac{N}{i=1}\frac{1}{N}\ln \frac{1}{N} = \ln N. \tag{6}$$

Centrality is a concept used in social network analysis to measure the degree to which a point in the network or a person is close to the center in the entire network. That is to say, by understanding the centrality of a node, the importance of this node in the network can be judged. At this time, the alliance cooperation network is the most uneven, and the network structure entropy is the smallest. The activities of other nodes in the supply chain are all turned around through this node [14, 15]. According to the calculation formula of vertex degree, it is easy to obtain the calculation results of node 1 and other nodes as follows:

$$I_1 = \frac{1}{2}, I_i = \frac{1}{2(N-1)} (j \neq 1). \tag{7}$$

According to the calculation formula of the entropy value, the entropy value of the supply chain network at this time can be obtained:

$$\begin{aligned} H(1) &= -\sum_{j=2}^{N}\frac{1}{2(N-1)}\ln\frac{1}{2(N-1)} - \frac{1}{2}\ln\frac{1}{2} \\ &= \frac{\ln 4(N-1)}{2}. \end{aligned} \tag{8}$$

When there are two core nodes in the supply chain network, it is assumed that the nodes are node 1 and node 2. All other nodes are connected to these two nodes, and the activities of other nodes in the supply chain are all turned around through the two nodes. According to the calculation formula of vertex degree, it is easy to obtain the calculation results of node 1, node 2 and other nodes as follows:

$$I_1 = I_2 = \frac{1}{3}, I_i = \frac{1}{3(N-2)} (i \neq 1, 2). \tag{9}$$

According to the calculation formula of the entropy value, the entropy value of the supply chain network at this time can be obtained:

$$\begin{aligned} H(2) &= -\frac{2}{3}\ln\frac{1}{3} - \sum_{i=2}^{N}\frac{1}{3(N-2)}\ln\frac{1}{3(N-2)} \\ &= \frac{\ln(27(N-2))}{3}. \end{aligned} \tag{10}$$

At this time, the network structure of the supply chain is much more stable than when there is only one core node

[16]. When a problem occurs in a certain link of the supply chain, if one of the core nodes fails to respond in time, the other core node can also adjust it, which greatly improves the stability of the supply chain.

3.3. Decision Tree Algorithm.

The decision tree algorithm is a method of approximating the value of a discrete function. It is a typical classification method that first processes the data, uses an inductive algorithm to generate readable rules and decision trees, and then uses the decisions to analyze the new data. Essentially a decision tree is the process of classifying data through a series of rules.

It is assumed that the proportion of the mth class samples in the current sample set D is $(m = 1, 2, \ldots, y)$ [17, 18]. Then the information entropy of D is defined as:

$$Ent(D) = -\sum_{m=1}^{|y|} p_m \log_2 p_m. \tag{11}$$

According to the above formula, the information entropy can be calculated D^X.

$$Gain(D, a) = Ent(D) - \sum_{X=1}^{X}\left(\left|D^X\right|/|D|\right)Ent\left(D^X\right). \tag{12}$$

It uses $a_* = \mathrm{argmaxGain}(D, a)$ for attribute division [19].

$$Gain_{ratio(D,a)} = \frac{Gain(D, a)}{IV(a)}. \tag{13}$$

In

$$IV(a) = -\sum_{X=1}^{X}\left(\left|D^X\right|/|D|\right)\log_2\left(\left|D^X\right|/|D|\right). \tag{14}$$

Deal with discrete distribution features without the process of pruning. At the same time, it uses the entropy model [20, 21].

3.4. Logistic Regression Model.

Logistic regression, also known as logistic regression analysis, which is a generalized linear regression analysis model, which is often used in data mining, automatic disease diagnosis, economic forecasting and other fields. Logistic regression is an easy-to-implement and excellent-performance classification model for linearly separable problems, and it is one of the most widely used models [22]. It first constructs a traditional linear regression model:

$$\mu = b + w_1 x_1 + \cdots + w_p x_p = w^T x + b. \tag{15}$$

In this model, the value range of μ is $(-\infty, +\infty)$.

It assumes that the two classes of the classification problem are $y = 1$ and $y = 0$, and the probability that $y = 1$ is assumed to be π.

$$\pi = \frac{1}{1 + e^{-\mu}}\mu \in (-\infty, +\infty). \tag{16}$$

With the Sigmoid function, $(-\infty, +\infty)$ can be projected onto $(0, 1)$. The binary classification problem of logistic regression can finally be expressed as:

$$\begin{cases} 0, \pi < 0.5, \\ 1, \pi > 0.5, \end{cases}$$

$$P(y=1) = \frac{1}{1+e^{-\mu}} = \frac{1}{1+e^{-(w^T x + b)}} = \frac{e^{-(w^T x + b)}}{1+e^{-(w^T x + b)}} = \pi,$$

$$p(y=0) = 1 - p(y=1) = \frac{1}{1+e^{-(w^T x + b)}} = 1 - \pi. \tag{17}$$

For ease of expression, assume $\theta = (w, b)$. Given a data set, the obtained likelihood function expression is:

$$L(\theta) = \prod_{i=1}^{m} (\pi)^{y_i} (1-\pi)^{1-y_i}. \tag{18}$$

To define the loss function $J(\theta)$ of Logistic regression as the inverse of the logarithm of the above formula, we can get:

$$J(\theta) = -lnL(\theta) = -\sum_{i=1}^{m} \left(y_i \ln(\pi) + (1-y_i)\ln(1-\pi) \right). \tag{19}$$

4. Value Assessment of China-Laos Channel Construction

In the analysis of the generating mechanism of the economic value of the channel, it is considered that the regional economic value of the channel is caused by trade. Therefore, This article will further quantify the trade value as the regional economic value to the regions along the Western Corridor. It assesses how much economic value the Western Corridor can bring to the area along the route.

4.1. Simultaneous Formula Model Theory. Although there is almost no research on the quantitative relationship between "channels and regional economic growth" in the academic world, there are many studies on the relationship between "trade and regional economic growth." In the "trade-regional economic growth" model, there have been a lot of mature research models. This paper intends to use the simultaneous formula model for empirical analysis of related aspects. Because changing the model can effectively solve the two-way causality problem of "chicken and egg," while other models can only solve the problem of single causality. Therefore, this paper regards the trade growth caused by the Western Corridor as an exogenous variable of economic growth, and influences the two endogenous variables of capital and employment for economic growth. Finally, it finds the impact of the opening of the Western Corridor on the entire economic growth system, and evaluates the regional economic value brought by the Western Corridor.

4.2. Model Construction. This paper constructs three endogenous variables (g) including the total import and export volume of the target country as an exogenous variable, economic aggregate, capital stock, and labor (g), 6 prerequisite variables (k) and 3 structural equations (i) composed of simultaneous formula models. In order to study the impact of changes in trade scale on the entire factor of production, the total import and export trade of China and Laos was added to the simultaneous formula model as an exogenous variable. This is used to measure the regional economic value, including production factors such as economic growth, capital accumulation and labor supply, brought by the Central-Laos West Corridor to the regions along the route. The specific form of the model is as follows:

$$\ln gdp = a_1 + a_2 \ln captial \\ + a_3 \ln labor + a_4 \ln trade, \tag{20}$$

$$\ln captial = b_1 + b_2 \ln rate + b_3 \ln captial(-1) \\ + b_4 \ln gdp(-1), \tag{21}$$

$$\ln labor = c_1 + c_2 \ln wage + c_3 \ln labor(-1) \\ + c_4 \ln trade + c_5 \ln gdp. \tag{22}$$

The specific description of the variables is shown in Table 1:

As shown in Table 1, the structural formula (22) is the output formula. The formula is based on a linear production function. Among them, A represents the total factor productivity in production activities, such as the improvement of enterprise management level, the improvement of labor factors, and the introduction of advanced technology. Structural formula (21) is the capital stock formula, the current interest rate (rate), the capital stock of the previous period (capita (-1)), and the economic aggregate of the previous period (gdp (-1)) are important factors that affect capital investment. Structural formula (22) is the labor supply formula, which uses the total number of employees at the end of the year (labor) to represent the input of labor factors. Average labor remuneration (wage), previous employment labor (-1), current economic aggregate (gdp), and total import and export (trade) are all important factors that affect labor supply.

The entropy value of the ESC network structure in the context of the OBOR can be obtained from the value of each vertex degree obtained by the calculation formula of the entropy value is 2.408. It calculates the maximum and minimum values of the ESC network structure entropy at this time. It can be obtained from formulas (6) and (8) that the maximum value of the ESC network entropy is 3.09, and the minimum value is 2.21. The calculated entropy value of the ESC network is very close to the entropy value of only one core node in the supply chain. It can be seen from this that the structural stability of the ESC under the background of theOBOR is relatively poor. Although there is more than one core node in the ESC network, most of the nodes in the entire network are connected through node 1. The variable

TABLE 1: Variable description.

Serial number	Variable	Expected symbol	Unit	Economic significance
1	gdp	+	Billion	Economic aggregate
2	Capital	+	Billion	Capital stock
3	Labor	+	10,000 people	Total number of employees at the end of the year
4	Trade	+	Million	Laos' total import and export
5	Wage	−	%	Loan benchmark interest rate
6	Capita (−1)	+	Yuan	Average salary of employees
7	Labor (−1)	+	Billion	Capital investment in the previous period
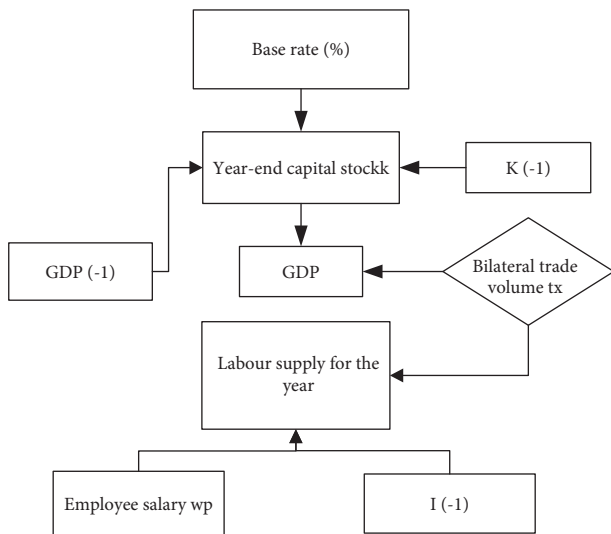
FIGURE 5: The relationship between variables of economic growth influencing factors.

relationship diagram of economic growth influencing factors is shown in Figure 5.

It can be seen from Figure 5 that the regional economic value is caused by the trade value. Therefore, this paper uses the import and export trade (trade) factor to replace the total factor productivity in the C_D function, and the import and export trade is endogenous to the economic growth. Lower interest rates will greatly stimulate the enthusiasm of private entrepreneurs to invest.

4.3. The Regional Economic Value Assessment of the Provinces and Cities Along the Route by the Western Corridor. The regional economic value of the Western Corridor to the regions along the route should include the total value of the opening of the Western Corridor to the economic growth, capital accumulation and employment level along the route. Among them, economic growth includes 0.01% of which the trade between the provinces along the route and Laos directly contributes to economic growth, and 0.02552% and 0.136048000% that indirectly contribute to economic growth through capital accumulation and labor supply. The elasticity of capital accumulation due to economic growth is 0.116, and the elasticity coefficient of employment level increase is 0.176. The regional economic value assessment of the Western Corridor is shown in Table 2.

The regional economic value of the Western Corridor is shown in Table 2, with the following conclusions:

(1) The opening of the Western Corridor has a positive correlation with the total economic value, capital accumulation and employment level of the cities along the line.

(2) The opening of the Western Corridor has obviously driven the development of the cities along the route. It will increase the GDP of the cities along the route by 3.954%, the total capital accumulation value by 0.4587%, and the total employment level by 0.0696%. The provinces have an average increase of 0.3954%, 0.0459% and 0.0696% respectively.

(3) As far as the provinces along the route are concerned, its impact on western western cities such as Ningxia, Qinghai, Gansu, Sichuan, and Yunnan is greater than that on central cities such as Chongqing, Inner Mongolia, and Shaanxi.

The scale of China's new energy market and photovoltaic industry is shown in Figure 6.

As shown in Figure 6, the data shows that in 2018, the scale of China's new energy market reached 882.254 billion yuan. It increased by 18.5% year-on-year, and it is expected that China's new energy market will reach 1,039.9 billion yuan in 2021. According to statistics, in 2020, China's cell output will be about 134.8 GW, a year-on-year increase of 22.2%.

5. Simulation Results

The ESC risk system is a complex dynamic system under the background of "One Belt One Road." In the causal flow diagram, the overall risk system of the ESC consists of two feedback loops. Combining the settings of parameters and functional relationships, the entropy changes of external risk and internal risk in 5 years and the evolution trend of risk are shown in Figure 7.

It is not difficult to see from Figure 7 that among the secondary indicators, the external risk entropy value grows the fastest over time. Its growth rate is much greater than that of the internal risk entropy value, and the larger the entropy value, the more unstable the risk system is. Therefore, it is necessary to pay attention to and control external risks during the operation of the ESC. Among them, for example: transportation risk, political risk and economic risk. It is not difficult to see from the growth trend of the graph that the risk has a slow growth trend in 3 years. The entropy of its risk increases rapidly after the third year, the growth rate almost doubles, and it continues to grow. This

TABLE 2: Regional economic value assessment of the western corridor.

Cities along the route	Trade boost	Total economic	Capital accumulation	Employment level
Inner Mongolia	0.20361	0.002365	0.000274	0.000416
Guangxi	0.395355	0.004592	0.000533	0.000808
Chongqing	0.153309	0.001781	0.000207	0.000313
Sichuan	0.370478	0.004303	0.000499	0.000757
Guizhou	0.344588	0.004003	0.000464	0.000704
Yunnan	0.203609	0.002365	0.000274	0.000416
Shaanxi	0.20816	0.002418	0.00028	0.000426
Gansu	0.514394	0.005975	0.000693	0.001052
Qinghai	0.522806	0.006073	0.000704	0.001069
Ningxia	0.487709	0.005665	0.000657	0.000997
Total	3.404016	0.03954	0.004587	0.006959
Average	0.340402	0.003954	0.000459	0.000696

(a)

(b)
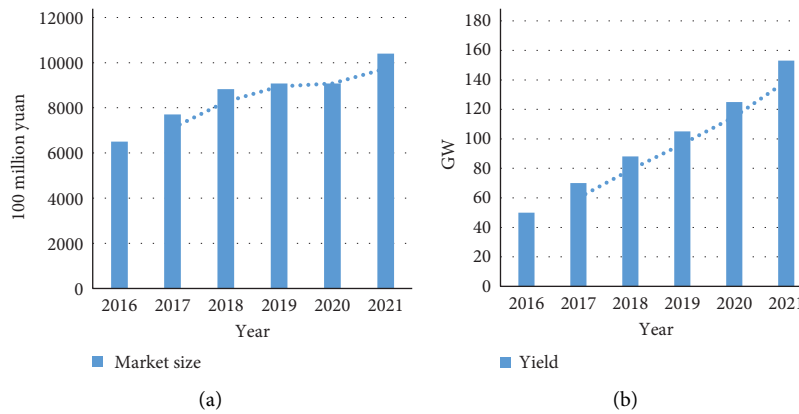
FIGURE 6: China's new energy market and photovoltaic industry scale. (a) New energy market. (b) The scale of photovoltaic industry.
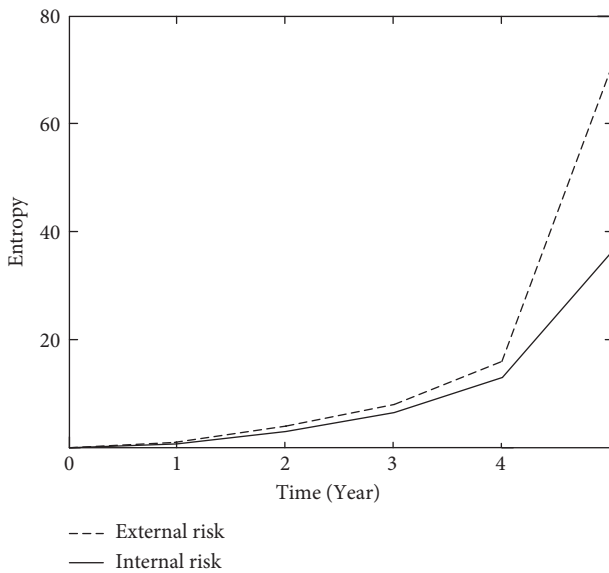

FIGURE 7: Change of entropy value of secondary indicators.

shows that with the advancement of time, there are more and more uncontrollable factors of risk.

In addition, there are many factors that affect the internal and external risks of the supply chain, and all factors are completely controlled, and the possibility of realization is very small. The sensitivity of the change of the entropy value of each risk factor to the change of the entropy value of the external risk system is analyzed. The results obtained are shown in Figure 8:

Figure 8 depicts the change trend of external risk entropy over time when a single factor changes. It can be clearly seen from the figure that the order of the impact of risk factors on external risk indicators is: sudden risk, political risk, policy risk, legal risk, and market risk. From the trend of the graph, it can be seen that the change trend of the entropy value of a single risk factor affecting external risk is not very large in the first two years. Its growth rate has been accelerating since the third year. The impact of political risk entropy changes on the external risk system ranks second and is controllable. For this reason, it should focus on controlling it in the process of building theOBOR ESC. By establishing good diplomatic relations with the countries along the route, it respects the wishes of the countries along the route and helps each other. This will try to avoid conflicts, etc., and reduce external risks in the ESC. The entropy values of policy risk and legal risk have similar growth rates and similar changing trends, indicating that the two have roughly the same proportion of their impact on internal risk. It should give the same attention to both when it manages and controls risks. The market risk entropy has the smallest growth rate, and the change trend of market risk and external risk is almost the
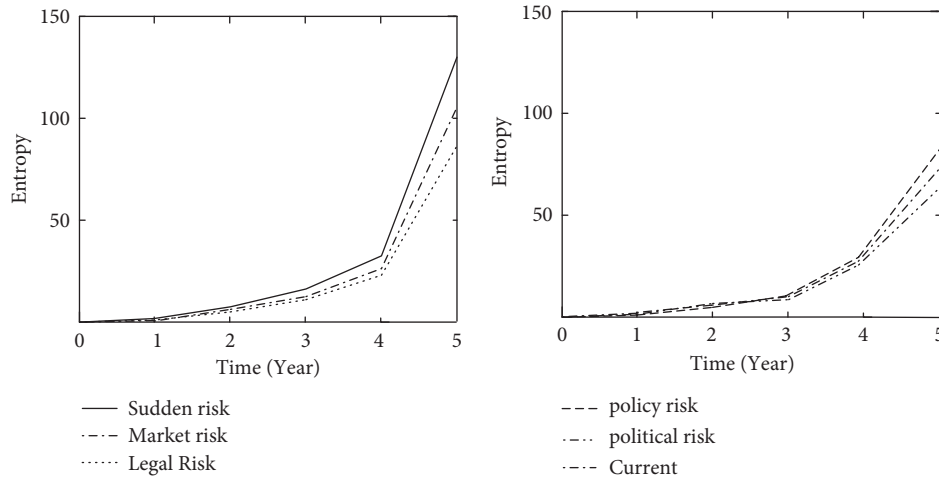
FIGURE 8: External risk sensitivity analysis.

same. In short, in the process of controlling external risks, we should pay close attention to the causes of sudden risks and political risks and control them. Secondly, we need to pay attention to changes in policy and legal risks, and finally, we should always pay attention to changes in the international energy market, so as to reduce the losses caused by external risks.

It controls other risk factors unchanged, and only increases the entropy value of cooperation risk, logistics risk, procurement risk, and management risk by 20%. It observes the change of the entropy value of internal risk, and analyzes the sensitivity of the change of the entropy value of each risk factor to the change of the entropy value of the internal risk system. The results obtained are shown in Figure 9:

Figure 9 depicts the change trend of internal risk entropy over time when a single factor changes. It can be clearly seen from the figure that the order of the impact of risk factors on internal risk indicators is from large to small: cooperation risk, logistics risk, management risk, and procurement risk. From the trend of the graph, it can be seen that the change trend of the entropy value of a single risk factor affecting internal risk is not very large in the first two years, and the growth rate has been accelerating since the third year. The growth rate of cooperative risk entropy is much greater than that of other risk factors. That is to say, the cooperation risk has the greatest impact on the internal risk of the ESC, and it should be mainly controlled in the process of risk management. The growth rate of the entropy value of logistics risk and management risk is similar, and the change trend is also very close. This shows that the two have roughly the same proportion of the impact on internal risks, and they should be given the same attention when managing and controlling risks. Procurement risk entropy growth rate is the smallest, and the change trend of procurement risk and internal risk is almost the same. This shows that procurement risk factors have less impact on internal risk changes and account for a lower proportion in the total risk system. In the process of risk management, if the experience that can be invested is limited, the control of procurement risks can be reduced accordingly. In general, for energy internal risk, each factor

change will have an impact on the entire subsystem, and the impact is long-term. The large changes in the entropy value all increase rapidly from the third year. Therefore, it is a long-term and comprehensive task to effectively control it, and a long-term plan should be made to manage internal risks well. This in turn reduces the likelihood of the risk occurring, allowing for effective risk management.

After analyzing the sensitivity of a single factor to external and internal risks, the entire ESC risk system is analyzed. The ESC risk system is jointly determined by two subsystems, external risk and internal risk. Therefore, this paper starts from the boundary point of the grass-roots level, determines the risk situation of the subsystem, and then determines the risk situation of the ESC. The specific situation is shown in Figure 10.

As can be seen from Figure 10, although the impact of internal risk on the entropy value of the ESC is not as large as that of external risk, its degree of impact cannot be ignored. To this end, while paying attention to external risk management and control, internal risk management should also be strengthened. In addition, it can be seen from the figure that whether it is external risk, internal risk or the risk of the entire ESC system, the large change in entropy value starts from the third year, and the trend is very obvious. The OBOR initiative is a long process of regional economic formation. The construction and development of the ESC is also constantly being improved, which makes the possibility of risks more likely. To this end, in addition to long-term planning, the management of the ESC should constantly discover risks and improve plans according to the actual situation. This makes the increase of the entropy value of the ESC risk system controlled within the short-term influence range.

Through bilateral trade between Laos and China, Lao enterprises can import high-quality industrial products from China and learn advanced industrial technology from China, which further improves the profitability of Lao enterprises and accelerates the modernization process of enterprises. Corporate profits are improved. In terms of national interests, Laos can not only benefit from China's economic
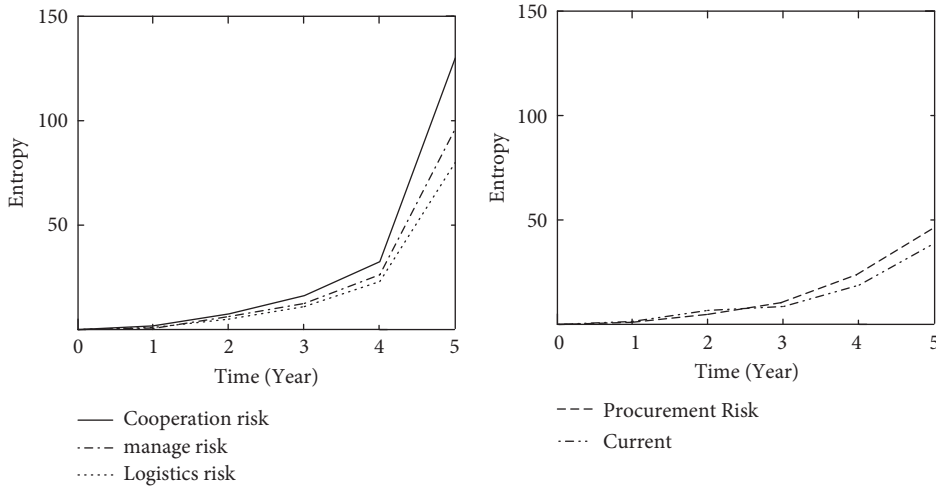
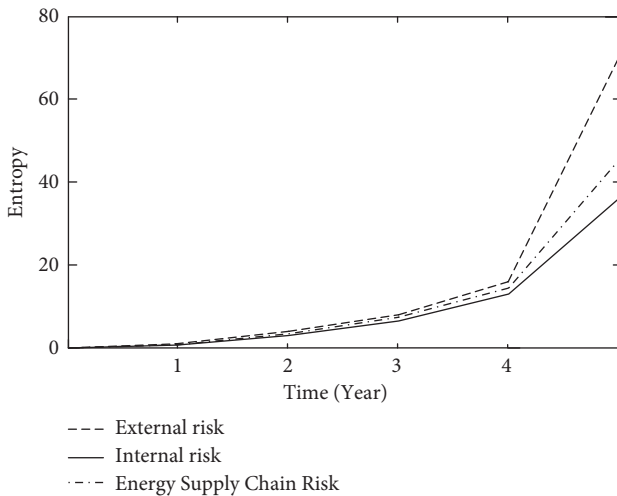FIGURE 9: Internal risk sensitivity analysis.

FIGURE 10: ESC risk and change in entropy value of secondary indicators.

growth and bilateral trade between China and Laos, but also from the economic growth of ASEAN countries, especially some neighboring countries, especially with the deepening cooperation in the ASEAN Free Trade Area. With the implementation of the "One Belt, One Road" strategy, regional cooperation and mutual influence will be further increased, and Laos will also gain more benefits from it. The Laos-China trade has increased a huge amount of revenue for Laos' finance, slowed down the increase in the scale of Laos' central fiscal debt, and eased the debt pressure to a certain extent. In addition, the implementation of bilateral trade between China and Laos has enabled Chinese industrial products to enter the Lao market smoothly, and at the same time, it can also drive Chinese capital and technology to flow into Laos, thereby promoting the upgrading of Laos' industrial structure and increasing the proportion of industry in Laos' entrepreneurship., laying the foundation for Laos to realize industrialization and modernization.

6. Conclusion

This paper analyzes the route and layout of the OBOR initiative and ESC research. It sorted out the basic energy situation of China and the countries along the route, and studied the connection between the OBOR and China's ESC. It summarizes the relevant energy cooperation between China and the countries along the OBOR, and analyzes the impact of China's ESC after the implementation of the OBOR and the impact of the construction of the ESC on the implementation of the OBOR. It puts forward corresponding suggestions on the risk management of the ESC from two aspects: external risk and internal risk. It includes strengthening coordination and consultation with governments of various countries based on the principle of mutual benefit and win-win, establishing sound policies and legal systems, and strengthening the collection of energy market information. It strengthens China's national defense and military forces and ensures the security of energy channels along the route. It actively participates in investment in the international energy market and exerts China's influence as a major power. It determines the new layout of energy cooperation and opens up new channels for energy transportation. This also adjusts the structure of energy production and consumption, and strengthens the management of energy enterprises. With the in-depth development of ASEAN integration and the further development of the "Belt and Road" strategy, the economic and trade cooperation between China and Laos will inevitably become more frequent. In a new stage of development, the problems and deficiencies in the economic and trade cooperation between China and Laos on the other side should be correctly faced and actively resolved by the Lao government, so as to seize this good opportunity for development and bring the level of economic development of Laos to a new level. However, there are still some problems in this paper. The analysis of China-Laos trade and freight transportation has reached a deep level. However, due to insufficient literature search, there is no in-depth analysis of the Belt and Road, resulting

in the innovation of the integration of the two has not reached the level. In the following research, we can start from the freight risk.

Data Availability

No data were used to support this study.

Conflicts of Interest

There is no potential conflicts of interest in this study.

Acknowledgments

References

[1] Y. Cui, "Application research of PPP mode in the international energy cooperation project under the background of "one belt and one road"," *World Scientific Research Journal*, vol. 5, no. 9, pp. 14–18, 2019.

[2] X. Guo, J. Zhang, J. Xue, and T. Yan, "A research on the gravity model of chinas oil trade in the strategic context of one belt one road," *Journal of Economics and International Finance*, vol. 9, no. 10, pp. 95–102, 2017.

[3] H. U. R. Solangi, F. G. Gilal, and M. Z. Tunio, "One belt one road initiative: the origin, current status, and challenges of china-pakistan economic corridor," *International Journal of Technology, Policy and Management*, vol. 18, no. 4, pp. 313–335, 2018.

[4] Z. Hussain, M. Yousaf, and C. Miao, "Investigating the simultaneous impacts on transport infrastructure:evidence from one-belt one-road countries," *Rivista Internazionale Di Economia Dei Transporti/International Journal of Transport Economics*, vol. 47, no. 4, pp. 402–418, 2021.

[5] A. Tulokhonov, D. Suochen, E. Garmaev et al., "Atlas of sustainable development of north asia in the context of the project "one belt, one road"," *InterCarto InterGIS*, vol. 26, no. 1, pp. 352–360, 2020.

[6] F. Gómez Martos, "China's "one belt, one road" initiative: prospects and challenges," *Przeglad Strategiczny*, vol. 10, pp. 321–334, 2017.

[7] S. R. Hasan and M. M. Karim, "Revised energy efficiency design index parameters for inland cargo ships of bangladesh," *Proceedings of the Institution of Mechanical Engineers - Part M: Journal of Engineering for the Maritime Environment*, vol. 234, no. 1, pp. 89–99, 2020.

[8] P. Mukherjee, D. Mishra, and S. De, "Exploiting temporal correlation in wireless channel for energy-efficient communication," *IEEE Transactions on Green Communications and Networking*, vol. 1, no. 4, pp. 381–394, 2017.

[9] A. J. Thubagere, W. Li, R. F. Johnson et al., "A cargo-sorting DNA robot," *Science*, vol. 357, pp. 6558–1112, 2017.

[10] V. Lostanlen, J. Salamon, M. Cartwright et al., "Per-channel energy normalization: why and how," *IEEE Signal Processing Letters*, vol. 26, no. 1, pp. 39–43, 2019.

[11] G. Yu, X. Tong, G. Han et al., "Completing site acceptance of electronic linear accelerator for cargo inspection," *Annual Report of China Institute of Atomic Energy*, pp. 197-198, 2017.

[12] B. Zhou, "Cooperation between china and africa under the one belt one road initiative: china's benefits and problems," *Chinese Studies*, vol. 08, no. 2, pp. 27–41, 2019.

[13] K. Sanin, "History and culture in the chinese one belt, one road initiative," *Far Eastern Affairs*, vol. 46, no. 4, pp. 105–117, 2018.

[14] W. Wang, L. Tang, J. Zheng, and J. Liu, "Opportunities and challenges for MBBS education of human parasitology under the background of one belt and one road," *OALib*, vol. 6, no. 9, pp. 1–6, 2019.

[15] M. N. I. Sarker, M. A. Hossin, Y. Hua, M. K. Sarkar, and N. Kumar, "Oil, gas and energy business under one belt one road strategic context," *Open Journal of Social Sciences*, vol. 6, no. 4, pp. 119–134, 2018.

[16] Z. K. Yang, C. Z. Yuan, and A. W. Xu, "Confined pyrolysis within a nanochannel to form a highly efficient single iron site catalyst for zn–air batteries," *ACS Energy Letters*, vol. 3, no. 10, pp. 2383–2389, 2018.

[17] G. Zakaria and S. Rahman, "Development of energy efficiency design index for inland cargo vessels of bangladesh," *Journal of Marine Science: Research & Development*, vol. 7, no. 4, pp. 1–8, 2017.

[18] S. Kumar and R. S. Bharj, "Solar hybrid e-cargo rickshaw for urban transportation demand in India," *Transportation Research Procedia*, vol. 48, no. 2, pp. 1998–2005, 2020.

[19] J. Herdzik, "Methane slip during cargo operations on LNG carriers and LNG-fueled vessels," *New Trends in Production Engineering*, vol. 1, no. 1, pp. 293–299, 2018.

[20] W. C. Chen, G. C. Yang, M. K. Chang, and W. C. Kwong, "Construction and analysis of shift-invariant, asynchronous-symmetric channel-hopping sequences for cognitive radio networks," *IEEE Transactions on Communications*, vol. 65, no. 4, pp. 1494–1506, 2017.

[21] J. Qi, J. Li, and S. Zheng, "A bifurcated vascular channel construction method based on diploic vein characteristics," *Journal of Bionics Engineering*, vol. 16, no. 5, pp. 814–827, 2019.

[22] A. L. Kleytman, I. O. Tyumentsev, and T. B. Ivanova, "On the problem of the volga-don channel construction in the scientific thought of russia of the 18th – the middle of the 20th Century," *Vestnik Volgogradskogo Gosudarstvennogo Universiteta Serija 4 Istorija Regionovedenie Mezhdunarodnye Otnoshenija*, vol. 23, no. 6, pp. 107–115, 2018.