

# Trade Competition and Complementarity between China and Turkmenistan and Potential Research

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## **Abstract:**

This paper made use of the comparative advantage index to calculate the complementarity and development potential and competitiveness of China-Turkmenistan trade in 2013-2020. The research results show that there was a long-term trade deficit and the trade structure was unreasonable. The comparative advantages between two countries are overlapping and have strong differences, the trade reflects strong complementarity with great development potential, and there is a large rising space in bilateral trade. The problem of weak diversity of Chinese-Turkmenistan trade should be valued. Finally, according to the research conclusion, offer the countermeasures and suggestions that China and Turkmenistan should strengthen bilateral trade cooperation and optimize the development environment of bilateral trade.

**Keywords:** Trade potential, Comparative advantages, Trade complementary.

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## **I. CHARACTERISTICS OF CHINA-TURKMENISTAN TRADE**

1.1 The Trade Deficit between China and Turkmenistan is Huge, Imports Account for the Vast Majority

From 2013 to 2020, the trade trend line showed type M (see Fig 1). The five inflection points of Type M were \$7,755.613 million in 2013, \$8,561.876 million in 2014, \$5,223.265 million in 2016, \$8,254.674 million in 2019, and \$5,626.451 million in 2020.

Overall, the import and export trade volume decreased from 2013 to 2020. In 2013 and 2014, bilateral trade exceeded US \$10 billion, reaching a new record. Bilateral trade in 2016 fell to \$5.9 billion due to the dropping price of the oil and gas. The reason for the significant decline in the bilateral trade volume is that all the major natural gas suppliers are mainly increasing

production and expanding exports, natural gas market supply is greater than demand, Russia was increasing its natural gas supply in Europe, The United States had also become a net exporter of natural gas, Iran's natural gas production capacity was gradually released, Qatar was increasing its exports to South Asia and Europe, Natural gas market supply ushered in an explosive growth, putting natural gas prices to a 10-year low level. In 2016, the average price of the British NBP natural gas market was 0.943 yuan/cubic meter, it fell sharply 30%, the import average price of Japanese LNG (LNG) was 1.38 yuan/cubic meter, fell 36%.China's price of imported natural gas had also reached a low record, with the average onshore price of imported pipeline gas falling to 1.27yuan/cubic meter [1].

In 2020, the sudden COVID-19 outbreak and the collapse in oil prices caused a huge impact on the stable and developing global natural gas market [2]. China-Turkmenistan natural gas trade was characterized by supply exceeding demand, natural gas prices bottoming out, and international trade volume growing against the trend, and bilateral trade volume fell to US \$6.5 billion.

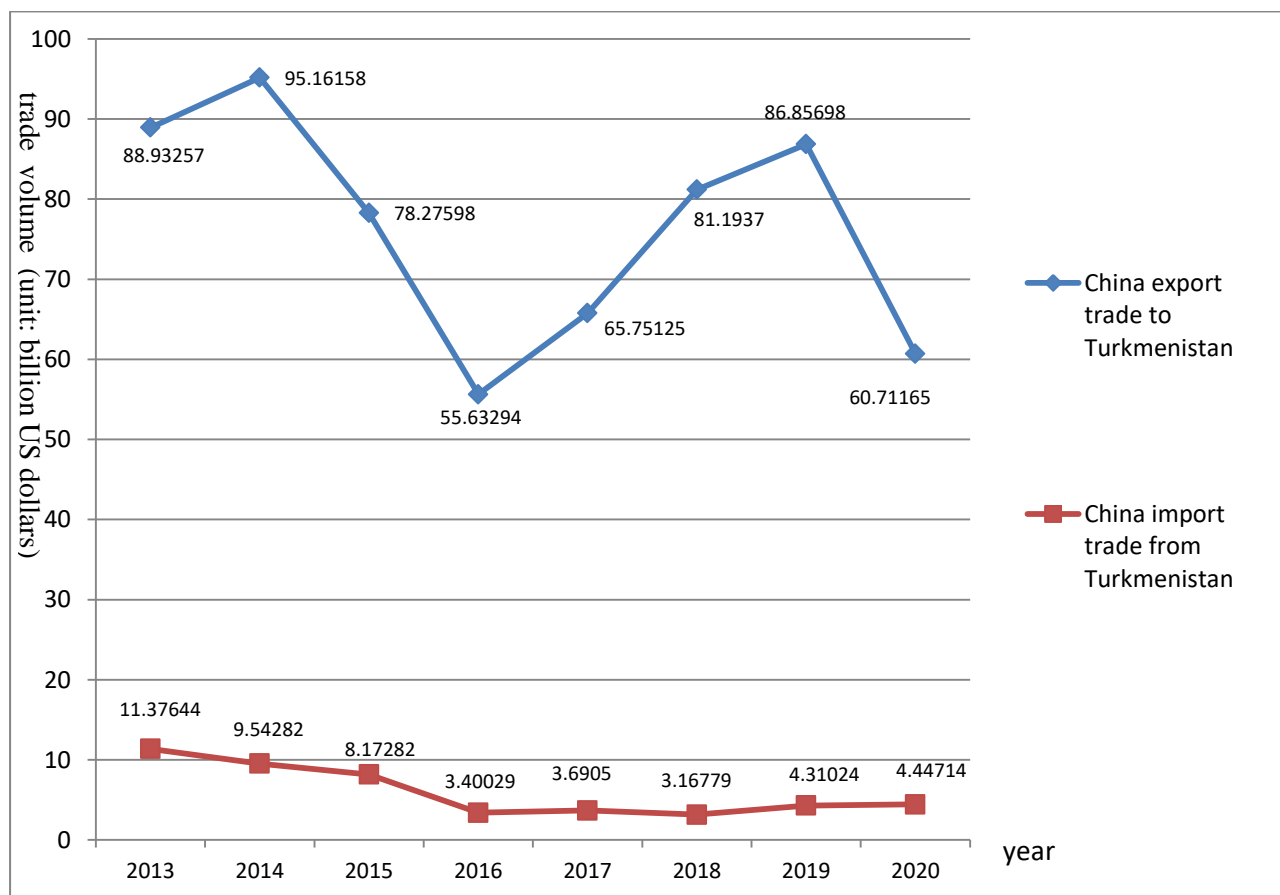


Fig 1: Trade volume between China and Turkmenistan

Source: The World Bank database

### 1.2 China's Import Trade Structure was Mainly in Primary Products, Natural Gas Imports Account for a Large Proportion of The Trade between China and Turkmenistan

From 2013-2020, the natural gas imports from Turkmenistan accounted for 99.03% (see Table I), salt, sulfur, gypsum, lime and cement accounted for 0.48%; cotton accounted for 0.15%; insect gum, gum and resin accounted for 0.1%, other commodities accounted for less than 0.1%, and the import and export structure was mainly primary products.

Turkmenistan has been the largest source of overseas natural gas in China as its largest natural gas supplier since 2012. Accounted for 51.4% of natural gas imports of China in 2012, from 2016 to 2020, the amount of natural gas imported from Turkmenistan accounted for 76.97%, 77.51%, 80.32%, 80.45%, 72.44% of the total imports of China.

China's imported natural gas is mainly imported by cross-border pipeline transportation, the imported gaseous natural gas comes mainly from the pipelines in Turkmenistan, Uzbekistan, Kazakhstan, Russia and Myanmar, but the price varies. The cheapest natural gas price in Myanmar in 2019 is \$0.196/kg, the others are in turn Turkmenistan \$0.358/kg, Kazakhstan \$3.49/kg, Russia \$3.67/kg, and Uzbekistan \$4.48/kg.

**Table I. Trade volume of various types of commodities accounts for China classified import trade volume from Turkmenistan (unit: %)**

year type	2013	2014	2015	2016	2017	2018	2019	2020
primary commodities	99.60	99.77	99.92	99.80	99.89	99.80	99.98	99.92
Capital and Technology Intensive products	0.39	0.23	0.07	0.20	0.10	0.20	0.02	0.08
labour intensive product	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Other items are not classified	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: As calculated from the World Bank database

### 1.3 China Exports Mainly Capital and Technology Intensive Products to Turkmenistan, but

the Export Scale is Small

From 2013 to 2020, the proportion of capital and technology intensive products accounted for 71.73% (see Table II), export amount is US\$3.49 million. Export of primary products accounted for 13.76%, exportation amount is US\$660,000. The export of labor-intensive goods accounted for 6.03%, and export amount is US\$360,000. The export ratio of capital and technology intensive products is between 54% and 77%, the export amount of the electromechanical and steel products is the largest; The export ratio of primary products is between 10% and 20%, rubber products and plastic products export the most; labor-intensive products are between 2% and 12%, and railway and tram locomotives, textiles and complete sets export the most.

**Table II. Trade volume of various types of commodities accounts for China classified exports to Turkmenistan (unit: %)**

Type \ Year	2013	2014	2015	2016	2017	2018	2019	2020
primary commodities	10.40	14.31	10.36	20.46	17.28	18.78	17.36	12.27
Capital and Technology Intensive products	76.89	66.16	77.24	54.40	71.80	74.04	76.09	77.28
labour intensive product	7.46	12.57	7.36	6.59	6.41	2.93	4.01	6.90
Other items are not classified	5.25	6.96	5.04	18.56	4.50	4.25	2.53	3.55

Source: As calculated from the World Bank database

#### 1.4 The Complementarity of Bilateral Trade is Not Fully Played

According to the analysis of trade complementarity, there are 48 types of commodities that are strong bilateral complementary, but there is no bilateral trade or less trade volume. Therefore, the two countries should work together to expand the bilateral import and export trade volume. From the perspective of single products, during 2013-2020, China's most exported products to Turkmenistan were chapter 84 boiler, machinery, chapter 73 steel products, chapter 85 motor, electrical equipment and chapter 87 vehicles, respectively accounting for 35.04%, 14.7%, 11.06% and 7.77%. The import and export volume of other 93 chapters accounted for 31.44%, among which single items accounted for no more than 4%, a total of 84 chapter items accounted for no more than 1%, and a total of 40 chapters of single items accounted for no more than 0.01%. Bilateral trade potential is huge, and the focus should be on strengthening the export of 48 types commodities that are less trade volume or no trade.

### 1.5 Bilateral Trade is Affected by Competition from Russia, Turkey, France and Other Countries

The trade between Russia, Turkey, France and Turkmenistan were more than the trade between China and Turkmenistan, the main reason are as follows: Firstly, the influence of the former Soviet Union, Russia and Turkmenistan economy has great ties, under the Soviet division of labor system, Turkmenistan is positioned as the origin of oil, natural gas and cotton [3], in particular, through the Central Asia-central natural gas pipeline, Turkmenistan exports a large amount of natural gas to Russia every year.

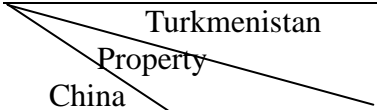
Secondly, the people of Turkmenistan regard Turkey as a brother. The two countries have good relations and are willing to carry out international trade with Turkmenistan's businessmen. Many foreign-invested projects are entrusted to Turkmenistan's businessmen to operate. In recent years, Turkey has paid more attention to Friendly communication with Central Asian countries, and has been expanding its influence in Central Asia. In October 2009, Turkey established the "Turkic State Cooperation Committee" between Turkey and Kazakhstan, Uzbekistan, Kyrgyzstan and Turkmenistan. On November 12, 2021, Turkey and Turkmenistan renamed the "Turkic State Cooperation Committee" to the "Turkish State Organization". Turkey used the same Turkic language relations with Turkmenistan and other Central Asian countries, and continued to strengthen its influence in economic, political, diplomatic aspects on Central Asia. Thirdly, France is constantly strengthening its presence in the Turkmenistan market. France is ready to work with Turkmenistan, including providing advanced technology. In 2010, French President Nicolas Sarkozy publicly stated that France-Turkmenistan relations are important as a key partner in regional peace and European energy security [4].

## **II. COMPETITIVE NATURE AND COMPLEMENTARITY OF CHINA-TURKMENISTAN TRADE**

According to David Ricardo's "Two benefits are compared to choose the largest one, two disadvantages are compared to choose the smallest one" principle, China and Turkmenistan should concentrated to produce and export its "comparative advantage" products, import its "comparative disadvantage" products, so according to the comparative advantage index size, 97 kinds of goods in China and Turkmenistan are divided into four categories (See Table III for details). Category I: The commodities with a large comparative advantage index of China and Turkmenistan are competitive commodities; Category II: The commodities with a small comparative advantage index of China and Turkmenistan, Neither country has a comparative advantage, there are few trade opportunities between two countries; Category III: Commodities

with China's large comparative advantage index and Turkmenistan's small comparative advantage index belong to complementary commodities, China should increase its exports to Turkmenistan; Category IV: Commodities with small China's comparative advantage index and Turkmenistan's large comparative advantage index belong to complementary commodities, China should step up its imports from Turkmenistan.

**Table III. Analysis of the trade competitiveness and complementarity between China and Turkmenistan**

	Turkmenistan's comparative advantage index is large	Turkmenistan's comparative advantage index is small
China's comparative advantage index is large	Competitive goods	Complementary Products (China should export to Turkmenistan)
China's comparative advantage index is small	Complementary Products (China should import from Turkmenistan)	No trade or trade volume is very small

Source: summarized according to the theory of comparative advantages

**Table IV. Average of commodity comparative advantage index between China and Turkmenistan during 2013 – 2020**

HS4 COD E	Commodity category	China	Turkmenistan	Trade type between China and Turkmenistan
11	Products of the milling industry	0.26	1.28	China's commodity comparative advantage index is smaller than the Turkmenistan commodity comparative advantage index, and the type of the commodity belongs to a complementary product. China should choose importing from Turkmenistan
14	Vegetable plaiting materials	0.92	16.12	
25	Salt; sulphur; earths and stone; plastering materials, lime and cement	0.59	2.13	
27	Mineral fuels, mineral oils and products of their distillation	0.13	7.67	
31	Fertilisers	0.97	3.05	
5	Products of animal origin	1.59	0.02	China's commodity comparative advantage index is greater than the Turkmenistan
7	Edible vegetables	1.04	0.28	

16	Preparations of meat, of fish or of crustaceans	1. 37	0.00	commodity comparative advantage index, and the type of the commodity belongs to complementary product. China should choose exporting to Turkmenistan
36	Explosives; pyrotechnic products	1. 48	0.03	
42	Articles of leather	2. 88	0.00	
43	Furskins and artificial fur	3. 07	0.00	
46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	4. 98	0.00	
50	Silk	3. 88	0.96	
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	1. 31	0.60	
53	Other vegetable textile fibres	2. 11	0.01	
54	Man-made filaments	2. 86	0.09	
55	Man-made staple fibres	2. 48	0.01	
56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	1. 58	0.05	
57	Carpets and other textile floor coverings	1. 32	0.06	
58	Special woven fabrics	2. 93	0.22	
59	Impregnated, coated, covered or laminated textile fabrics	2. 24	0.01	
60	Knitted or crocheted fabrics	3. 46	0.05	
61	Articles of apparel and clothing accessories, knitted or crocheted	2. 68	0.02	
62	Articles of apparel and clothing accessories, not knitted or crocheted	2. 48	0.16	
63	Other made-up textile articles	3. 40	0.99	
64	Footwear, gaiters and the like	2. 83	0.00	
65	Headgear	3. 72	0.00	
66	Umbrellas, sun umbrellas, walking sticks,	5.	0.00	

	seat-sticks, whips, riding-crops	94		
67	Prepared feathers and down and articles made of feathers or of down; artificial flowers	5.74	0.00	
68	Articles of stone, plaster, cement, asbestos, mica or similar materials	1.71	0.07	
69	Ceramic products	3.05	0.01	
70	Glass and glassware	1.72	0.06	
73	Articles of iron or steel	1.59	0.01	
76	Aluminium and articles	1.05	0.01	
81	Other base metals; cermets; articles thereof	1.44	0.00	
82	Tools, implements, cutlery, spoons and forks, of base metal	1.81	0.00	
83	Miscellaneous articles of base metal	2.02	0.01	
84	Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	1.44	0.01	
85	Electrical machinery and equipment and parts thereof	1.87	0.00	
86	Railway or tramway locomotives, rolling stock and parts thereof	2.12	0.02	
92	Musical instruments	1.96	0.00	
94	Furniture	2.94	0.00	
95	Toys, games and sports requisites	3.59	0.00	
96	Miscellaneous manufactured articles	2.35	0.00	
13	Lac; gums, resins and other vegetable saps and extracts	1.34	4.27	Both commodity comparative advantage indexes of China and Turkmenistan are greater than 1, which are comparative advantage commodities and the type of the products belongs to competitive
52	Cotton	1.96	12.91	
89	Ships, boats and floating structures	1.44	1.03	



				commodity
1	Live animals	0.19	0.00	Both the commodity comparative advantage indexes of China and Turkmenistan are less than 1, which are relatively inferior commodities, and the trade possibility of the two sides is very small
2	Meat and edible meat offal	0.06	0.00	
3	Fish and crustaceans, molluscs and other aquatic invertebrates	0.87	0.01	
4	Dairy produce	0.05	0.05	
6	Live trees and other plants	0.13	0.06	
8	Edible fruit and nuts	0.35	0.03	
9	Coffee, tea, mate and spices	0.47	0.00	
10	Cereals	0.05	0.23	
12	Oil seeds and oleaginous fruit	0.22	0.08	
15	Animal or vegetable fats and oils and their cleavage products	0.07	0.38	
17	Sugars and sugar confectionery	0.29	0.01	
18	Cocoa and cocoa preparations	0.06	0.05	
19	Preparations of cereals, flour, starch or milk	0.19	0.01	
20	Preparations of vegetables, fruit, nuts or other parts of plants	0.95	0.01	
21	Miscellaneous edible preparations	0.36	0.00	
22	Beverages, spirits and vinegar	0.13	0.00	
23	Residues and waste from the food industries	0.29	0.05	
24	Tobacco and manufactured tobacco substitutes	0.23	0.00	
26	Ores, slag and ash	0.03	0.00	
28	Inorganic chemicals	0.96	0.29	
29	Organic chemicals	0.	0.00	

		96	
30	Pharmaceutical products	0.11	0.00
32	Tanning or dyeing extracts	0.66	0.00
33	Essential oils and resinoid	0.28	0.00
34	Soap, organic surface-active agents	0.49	0.01
35	Albuminoidal substances	0.75	0.00
37	Photographic or cinematographic goods	0.56	0.00
38	Miscellaneous chemical products	0.62	0.01
39	Plastics and articles thereof	0.94	0.31
40	Rubber and articles thereof	0.90	0.00
41	Raw hides and skins	0.19	0.62
44	Wood and articles of wood	0.78	0.00
45	Cork and articles of cork	0.09	0.00
47	Pulp of wood or of other fibrous cellulosic material	0.02	0.00
48	Paper and paperboard	0.87	0.00
49	Printed books, newspapers, pictures	0.75	0.00
71	Natural or cultured pearls, precious or semi-precious stones, precious metals	0.33	0.07
72	Iron and steel	0.92	0.01
74	Copper and articles thereof	0.34	0.08
75	Nickel and articles thereof	0.25	0.00
78	Lead and articles thereof	0.11	0.01
79	Zinc and articles thereof	0.	0.00

		17	
80	Tin and articles thereof	0.13	0.00
87	Vehicles other than railway or tramway rolling stock	0.37	0.01
88	Aircraft, spacecraft	0.08	0.03
90	Precision instruments and equipment	0.97	0.06
91	Clocks and watches	0.74	0.00
93	Arms and ammunition	0.08	0.00
97	Works of art	0.15	0.05
99	Commodities not elsewhere specified	0.14	0.04

Source: As calculated from the World Bank database

According to Tables III and IV, China and Turkmenistan commodities can be classified into the following four categories:

1. Competitive commodities between China and Turkmenistan include: Chapter 13 Lac; gums, resins; Chapter 52 cotton; Chapter 89 Ships, boats and floating structures. Although China's Lac; gums, resins of chapter 13 belong to commodities with obvious comparative advantages, China's comparative advantage index is 1.34, far less than Turkmenistan's comparative advantage index 4.27, China imports about US \$6-10 million of such goods from Turkmenistan, while China exports few to Turkmenistan, in 2019, US \$11,000. The comparative advantage index of the cotton between China and Turkmenistan is more different. China is 1.96 and it is 12.91 in Turkmenistan. The real trade and comparative advantage index show the same situation. China imports cotton from Turkmenistan every year, and the import amount is between US \$480 and US \$33 million, Turkmenistan's cotton has comparative advantages, which is related to Turkmenistan's policy to support cotton production. Since the founding of the Republic in 1991, the state has vigorously encouraged the development of traditional advantageous agriculture such as cotton. The practice has proved that the cotton industry has developed well and the policy effect is obvious. The China's comparative advantage index of the ships and floating structures is slightly dominant, China's comparative advantage index of 1.44 is greater than 1.03 in Turkmenistan. The annual export value to Turkmenistan is between US \$1 million and 18.47 million.

2. Complementary commodities between China and Turkmenistan (Chinese commodities imported from Turkmenistan) are: Chapter 11 Powder industrial products, malt, starch, gluten; Chapter 14 Plant materials for preparation; Chapter 25 Salt, Sulfur, earths and stone, plastering materials, lime and cement; Chapter 27 Mineral fuels, mineral oils and products of their distillation; Chapter 31 Fertilizers. For the above five commodities, China's comparative advantage index is all less than 1, while Turkmenistan's comparative advantage index is all greater than 1. Turkmenistan's comparative advantage is obviously better than China. China should choose to import from Turkmenistan, which is a complementary product. In particular, the comparative advantages of plant materials and natural gas are very large, and the index has reached 16.12 and 7.67, respectively. Turkmenistan has absolute advantages and should increase the number of exports to China. In real trade, China's imports of the above five commodities from Turkmenistan are not exactly consistent with the situation shown by the comparative advantage index. Only the import of natural gas in Chapter 27 is in line with the comparative advantage theory. China imported a large quantities, which is between US\$5.4 billion and US\$9.4 billion from 2013 to 2020, and the other four commodities imported very little or no imports. Therefore, China should expand the import of goods in chapters 11, 14, 25 and 31 and strengthen bilateral trade cooperation.

3. Complementary commodities between China and Turkmenistan (China exports to Turkmenistan) are: Chapter 05 Other Animal Products; Chapter 07 edible vegetables; Chapter 16 meat, fish, crustaceans products; Chapter 36 explosives, fireworks products; Chapter 42 leather products; Chapter 43 fur, artificial fur and its products; Chapter 46 basket and other woven material products; Chapter 50 silk; Chapter 51 wool and its mechanical fabric; Chapter 53 plant textile fiber; Chapter 54 chemical fiber filament; Chapter 55 chemical fiber staple fiber; Chapter 56 Wadding, felt and nonwovens; Chapter 57 Carpet; Chapter 58 Special Machine Fabric; Chapter 59 Industrial Textile Products; Chapter 60 Knitted or crocheted fabrics; Chapter 61 Clothing; Chapter 62 Non-knitted or non-crocheted clothing; Chapter 63 Other textile finished products; Chapter 64 Shoes and boots; Chapter 65 Hat Class; Chapter 66 Umbrellas, sun umbrellas, walking sticks, seat-sticks, whips, riding-crops, horsewhip; Chapter 67 Down Products; Artificial flowers; Human hair products; Chapter 68 Stone materials, gypsum, cement and other products; Chapter 69 Ceramic Products; Chapter 70 Glass and its Products; Chapter 73 Iron and Steel Products; Chapter 76 Aluminum Products; Chapter 81 Base metal and ceramic products; Chapter 82 Metal tools and instruments; Chapter 83 Basal Metal Miscellaneous Products; Chapter 84 Nuclear reactor, boiler and machine; Chapter 85 Electric Motors and Electrical Equipment; Chapter 86 Railway and trolley road locomotive; Chapter 92 Musical Instruments; Chapter 94 Furniture; Chapter 95 Toys, Games, Sports Goods; Chapter 96 Miscellaneous Products.

For the above 39 commodities, China's comparative advantage index is all greater than 1, while the Turkmenistan commodity comparative advantage index is all less than 1, Turkmenistan has an absolute disadvantage, with only silk, rugs, wool and their machine fabrics have greater comparative advantage index, which are 0.96, 0.99 and 0.60 respectively. Other goods basically have almost no advantage, and China has absolute advantages and strong bilateral complementarity, China should increase its exports to Turkmenistan.

Most of the above commodities are labor-intensive commodities or light industrial commodities, indicating that Turkmenistan still has not gotten rid of the weak economic structure before independence, light industrial products need a large number of products to be imported, and there is still room for optimization of the economic structure.

4. China has no trade or small trade with Turkmenistan are: Chapter 01 Active Objects; Chapter 02 Meat and miscellaneous; Chapter 03 octopus; Chapter 04 Dairy Products and Eggs; Chapter 06 Living Trees and other Living Plants; Chapter 08 Edible Fruit and Nuts; Chapter 09 Coffee, Tea; Chapter 10 Grain; Chapter 12 Oil-containing kernel and fruit; Chapter 15 Dynamic and vegetable oil; Chapter 17 Sugar and Sugar Food; Chapter 18 Available Products; Chapter 19 Products of grain powder, starch, or milk; Chapter 20: Vegetables, Fruits, and Nuts Products; Chapter 21 Miscellaneous Food; Chapter 22 Drinks, Wine and Vinegar; Chapter 23 Prepare the animal feed; Chapter 24: Tobacco; Chapter 26 Mineral sand; Chapter 28 Inorganic Chemicals; Chapter 29 Organic Chemicals; Chapter 30 Drugs; Chapter 32 Dye and Paint; Chapter 33 Essential oils and ointment; Chapter 34 Lubricant, Candle; Chapter 35 Modified starch; Chapter 37 Photo and Film Supplies; Chapter 38 Miscellaneous Chemical Products; Chapter 39 Plastics and Products; Chapter 40 Rubber & Products; Chapter 41 Raw skin (except fur) and leather; Chapter 44 Wood and Wood Products; Chapter 45 Cork and cork Products; Chapter 47 Wood pulp and waste paper; Chapter 48 Pulp, paper, or paperboard products; 49 Chapter Books, newspapers, and other prints; Chapter 71 Natural or cultured pearls and precious stones; Chapter 72 Iron and Steel; Chapter 74 Copper and its Products; Chapter 75 Nickel and Its Products; Chapter 78 Lead and its Products; Chapter 79 Zinc and its products; Chapter 80 tin and its products; Chapter 87 Vehicles; Chapter 88 Aircraft, spacecraft and their Parts; Chapter 90 Precision Instruments and Equipment; Chapter 91 Clocks; Chapter 93 Arms, Ammunition; Chapter 97 Art, Collections; Chapter 99 Special Trading Products and Unclassified Goods.

### **III. ANALYSIS OF THE TRADE POTENTIAL OF CHINA'S TURKMENISTAN**

Through analyzing there are many complementary products between China and Turkmenistan, 44 products have complementary products are divided into two categories, The

first category is that Turkmenistan's comparative advantage index is greater than 1, and China's comparative advantage index is less than 1. According to the comparative advantage theory, China has a comparative disadvantage and should import goods from Turkmenistan. The second category is that China's comparative advantage index is greater than 1, and Turkmenistan's comparative advantage index is less than 1. According to the comparative advantage theory, Turkmenistan has a comparative disadvantage and should import goods from China.

Among them, there are 5 complementary commodities which has obvious comparative advantages in Turkmenistan and which has weak comparative advantages in China. They include: Chapter 11 powder industrial products; Chapter 14 plant materials for preparation and junction; Chapter 25 salt, sulfur, gypsum material, lime and cement; Chapter 27 mineral fuel, mineral oil and its distilled products; and Chapter 31 fertilizer. More bilateral import and export of plant materials, salt, sulfur, gypsum material, lime, cement, mineral fuel, mineral oil and its distillation products, the commodities of Chapter 14, Chapter 25, Chapter 27 import and export accounted for 96.29%, 13.99% and 88.72% of Turkmenistan's export volume in 2020. Natural gas is the most important trading commodity between China and Turkmenistan. China is the largest exporter of natural gas in Turkmenistan. Turkmenistan exports about 40 billion cubic meters of natural gas to China through pipelines every year, which is 6-7 times the amount that Turkmenistan exported to Russia. China imported US\$6.04 billion of natural gas from Turkmenistan in 2020, it accounted for 99.4% of the bilateral import trade. However, the trade of flour industry products and fertilizer is insufficient, and the comparative advantage index of Turkmenistan flour industry products and fertilizer is 1.28 and 3.05, it is 1.02 and 2.08 larger than China's comparative advantage index respectively, however, the two sides did not trade, and the bilateral trade potential is greater.

Among them, there are 39 complementary commodities with obvious comparative advantages and weak comparative advantages in Turkmenistan.

According to the industrial source sector and processing stage of the goods, all the trade commodities are divided into 10 categories, including SITC0-4 are primary products, SITC5 and SITC7 are capital and technology-intensive products, SITC6 and SITC8 are labor-intensive products, and SITC9 are other unclassified products. Among them, labor-intensive products' proportion were the largest which was 52.51%, capital and technology-intensive products' proportion were 18.54%; primary products' proportion were the smallest which was 0.53%, and unclassified other commodities were 28.71%.

Both China and Turkmenistan have three competitive products, their comparative

advantage indexes all are greater than 1, respectively, chapter 13 insect gum, tree gum and resin, and 52 chapter cotton, Chapter 89 Ship and floating structures. Among them, Chapter 13 and 52 showed obvious competitive performance, China and Turkmenistan have mutual import and export, China imports a large number of insect gum, tree gum and resin from Turkmenistan, it accounts for 42.15% of the export amount of insect gum, tree gum and resin in Turkmenistan, And China exports small amounts of insect gum, tree gum and resin to Turkmenistan, which accounted for 2.22% of the import amount of insect gum, tree gum and resin in Turkmenistan. This fits with the size of the two-sided comparative advantage index, the comparative advantage index of insect gum, tree gum and resin between China and Turkmenistan was 1.34 and 4.27 respectively. According to the theory of comparative advantage, Countries with a large comparative advantage index should concentrate on their production and export commodities, Countries with a small comparative advantage index should reduce their production and import goods.

#### **IV. COUNTERMEASURES AND SUGGESTIONS**

##### **4.1 Continue to Increase the Energy Cooperation between China and Turkmenistan**

Energy has always been an important export product of Turkmenistan that exported US\$10 billion's natural gas in 2019, it accounted for 22% of GDP. In addition, Turkmenistan's natural gas export is geoinfluenced by landlocked countries and restricted by Russia. Therefore, in recent years, Turkmenistan is seeking a diversified energy export strategy, constantly seeking to increase the domestic natural gas export channels, and effectively improve the natural gas export volume. Mainly seek breakthrough in four directions, north channel use central Asia-central gas pipeline to Russia, south channel is sent to Iran Kobbez-Kordekuyi pipeline and Dulipabad-Shelaher pipeline, west channel is through the Caspian Sea to Europe, east channel is through the gas pipeline line A/B/C/D to China. China imported US\$33.45 billion of natural gas in 2020, including US\$6 billion from Turkmenistan. As the realization date of China's "carbon peak and carbon neutral" target gets closer and closer, China's demand for natural gas which cause less environmental pollution will further expand in the future. The demand gap in China's natural gas is expected to be 120-170 billion cubic meters by 2030. Therefore, the bilateral natural gas cooperation between China and Turkmenistan has broad prospects.

##### **4.2 Increase the Grain Trade between China and Turkmenistan**

Since Turkmenistan's independence, although the government has adopted the purchase of seeds, exempted farmers from taxes, provided farmers with technical services, provided



irrigation and water-saving technology and crop protection, the situation of food self-sufficiency has remained unchanged. In 1997, a net grain import achieved 6.1 million tons, total amount of US\$80.97 million, and the volume was about 1.4 million tons in 2020, total amount of US\$17.539 million.

Food self-sufficiency has nothing to do with the number of arable land, the per capita arable land area in Turkmenistan is 0.3426 hectares, higher than the world per capita level of 0.206 hectares. Food cannot self-sufficiency is mainly due to backward agricultural production technology and dry agricultural environment. In 2017, Turkmenistan's food output per capita was 207 kg, which was far below the internationally recognized food security standard line of 400 kg [5] In 2018, Turkmenistan grain average output was 1069 kg per hectare, which was far below the average world yield value of 4070 kg per hectare [6]. China's annual grain output has increased steadily year by year, which have reached 669.49 million tons in 2020. In 2020, 3.54 million tons of grain was exported, and bilateral grain trade cooperation has good prospects.

#### 4.3 Strengthen Trade Cooperation in the Import and Export of Cotton Products

Turkmenistan agriculture is mainly planting cotton, natural and climatic conditions are conducive to planting medium fiber and fine fiber cotton varieties, cotton planting area in 2020 was 620,000 hectares, accounting for 31.92% of the cultivated land area. Cotton production was 12.5 million tons in 2020 [7], It rose 8.73 times than 1.432,000 tons of in 1991 [3]. Cotton products have always been a strong comparative advantage of Turkmenistan. In 1997, net export of cotton products was US\$115 million, and net export was US\$177 million in 2020. This comparative advantage has existed more than 90 years since the Soviet era, and the main trading partners include: 11 CIS countries, 11 European countries and 10 Asian countries, which export US\$8.63 million, US\$35.81 million and US\$75.54 million respectively. Among them, the import and export trade of cotton products between China and Turkmenistan was not large, and the trade situation has not changed from 1997 to 2020. In 1997, China exported US \$350,000 to Turkmenistan, and in 2009, it exported US \$96,000. Net exports to Turkmenistan were \$3,621 million in 2020, thus great potential to strengthen bilateral cooperation on cotton products.

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