



Qinghai Province Industrial Structure Adjustment and Sustainable Development

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Abstract

Sustainable development is one of the basic requirements of the Scientific Outlook on Development. It is a theory and strategy for the coordinated development of nature, science and technology, economy, and society. As an important province in northwest China, Qinghai has important industries such as energy, tourism, agriculture, and animal husbandry. The field has unique resource advantages, rich in mineral resources and unique natural scenery. As one of the country's important regional economic development areas, it has made certain achievements in industrial structure adjustment and sustainable development in recent years. However, Qinghai's economic development is faced with problems such as a single industrial structure, excessive resource dependence, and unreasonable resource utilization. This article mainly analyzes the current status of the industrial structure in Qinghai Province, and discusses the challenges and coping strategies that need to be promoted more actively to adjust industrial structure in order to achieve sustainable economic development.

Subject Areas

Development Economics

Keywords

Qinghai Province, Industrial Structure Adjustment, Sustainable Development, Environmental Protection

1. Introduction

Qinghai Province is located in the west of China, with a total area of 722,300 square kilometers. The province is more than 1,200 kilometers long from east to west and more than 800 kilometers wide from north to south. It accounts for

one-third of the country's total area. It ranks third in the country after Xinjiang, Xizang, and Inner Mongolia. It ranks fourth among all provinces, municipalities and autonomous regions in the county. There are 2 prefecture-level cities and 6 autonomous prefectures as the main administrative units in the province's administrative divisions. The province has a total resident population of approximately 5.92 million. In 2022, Qinghai Province's GDP ranked 30th in the country. There are 10 listed companies, mainly located in Xining City, Geermu City, and Haidong City. The total market value of the province is approximately 188.3 billion. The deposit balance of financial institutions is 672.8 billion yuan in 2021. The total GDP of Qinghai Province is 361 billion yuan in 2022. The nominal GDP growth rate is 7.9%, and the actual GDP growth rate is 2.3% [1]. In recent years, Qinghai has, under the premise of ecological protection, actively developed strategic new industries, clean energy, and recycling industries, and has formed a resource-based industrial structure system.

2. The Importance and Relevance of Industrial Structure Adjustment and Sustainable Development

Measuring whether a country and a region is advanced is a multi-dimensional and complex issue. There are three main indicators of economic, environmental and social aspects that are indispensable for measuring sustainable development [2]. Economic growth and development are often considered one of the most critical elements for countries and regions to move forward. In 2022, China's total GDP will be approximately 120 trillion yuan, Guangdong Province's GDP will be 12,911.9 billion yuan, Qinghai's total GDP will be 361 billion yuan, Qinghai's land area will be approximately 8% of China's total land area, and Qinghai's GDP will account for approximately 0.299% of the national GDP. Only accounts for 2.79% of the GDP of Guangdong Province, and the land area of Guangdong Province is only 2.16% of the total land area of the country [3]. There is a huge gap between the scale and level of economic development and comprehensive strength. There is a strong contrast between abundant resources and a backward economy. What causes such a difference? The reason is that in addition to historical factors, geographical factors and policy factors in Qinghai's economy, the main reason is that the unreasonable regional industrial structure seriously restricts the growth and development of Qinghai's regional economy. Industrial structure reflects the level of economic development, intrinsic vitality, degree of development and growth potential of a country or region. There are various divisions of industrial structure. The traditional classification method is the three major industry classification method, which divides all economic activities into primary industry, secondary industry and tertiary industry. The primary industry refers to the direct acquisition of products from natural resources. The economic sectors include agriculture, animal husbandry, fishery, mining, etc. The secondary industry refers to the industry that processes and manufactures products, covering the industrial sector and manufacturing. The tertiary industry is the service indus-

try, including retail, finance, education, Healthcare, entertainment industry, etc. Under this model, the transformation of the economic center of gravity is the development process from the primary industry to the secondary industry, and finally to the tertiary industry, that is, the industrial structure is marked from a “3-2-1 structure” to a “1-2-3” structure process. The “3-2-1” structure refers to an industrial structure model, that is, the tertiary industry is at the top and is the main part supporting the economy, providing most of the employment opportunities and growth. The secondary industry is at the second layer and is responsible for producing goods and product. In the same way, the “1-2-3” structure is the opposite industrial structure to the “3-2-1” structure. Since the 1980s, China has begun to adopt the division method of three major industries, dividing agriculture, forestry, animal husbandry and fishery into the primary industry, manufacturing and basic industries into the secondary industry, and the service industry into the tertiary industry. Rapid economic growth is always accompanied by timely adjustments to the industrial structure. The ability to adjust and transform the industrial structure determines the rise and fall of a country and a region’s economy. People also realize that the side effects of simple economic growth are getting bigger and bigger, and economic development needs to be sustainable. Economic development needs to take into account the balance of society, environment and economy to ensure the rational use of resources, environmental protection and social stability. The sustainable development model can promote innovation, improve efficiency and help reduce resource waste, reduce environmental pollution, and increase social inclusiveness and fairness.

As we all know, sustainable development is closely related to population, environment, and resources. First of all, population and resources (such as mineral resources and land) provide basic production conditions and objects, while the environment provides the physical places and spatial places necessary for economic development. The quality of the ecological balance maintenance of the ecological environment, reusability and recycling determine whether economic development is sustainable. On the other hand, whether the industrial structure adjustment is successful will have a very important impact on population, resources, and the environment: 1) When the industrial structure adjustment is based on the sustainability of the ecological environment, the industrial structural adjustment can optimize the ecological environment. i) Industrial structure adjustment can change the demand for population and population flow in various industries. The reduction of traditional industries affects employment opportunities in related industries. The development of emerging industries may create new employment opportunities; at the same time, it affects the flow and structure of the population. Some areas will experience population outflow due to the reduction of industries, while areas where emerging industries are concentrated may attract population inflows, leading to changes in the population structure; ii) Industrial structure adjustment will affect the way resources are used, such as the transformation from traditional resource-intensive industries

to technological innovation and green industries, thereby reducing the demand and consumption of resources; it will also affect sustainable development. A reasonable industrial structure will help to optimize resource utilization, move towards more sustainable development, reduce dependence on non-renewable resources, and better protect and manage resources; iii) Industrial structure adjustment can help reduce negative impacts on the environment. Turning to green technology and clean energy can reduce pollutant emissions and is conducive to environmental protection. The development of environmentally friendly industries and the implementation of green production methods can help protect the ecosystem and maintain ecological balance; 2) When the industrial structure adjustment is based on the non-sustainability of the ecological environment, it will have a negative impact on the economy, society and environment. Resource depletion and environmental damage, ecological damage and climate change will intensify, which will also lead to economic consequences. Unfavorable other phenomena occur, and the “spillover effects” caused by environmental unsustainability can have far-reaching consequences. For example, population migration and rising crime rates, etc. [4]. The phenomenon of “sustainability change” as a response is defined as a fundamental shift towards a sustainable society [5]. This phenomenon witnesses the spatial attributes of local identity and other related factors, including: political environment, natural resource endowment [6], resource management [7] and local technical and industrial specialization [8] [9]. It can be seen that the deep impact of non-sustainability is that the economy is severely affected by price fluctuations of natural resources and environmental changes, causing economic instability, environmental deterioration and resource depletion, which will intensify social divisions and inequality cause social injustice. One of the most critical goals of industrial restructuring is to achieve sustainable development of the economy, society, and environment, and to promote positive interactions among these three to ensure long-term and steady development.

3. Analysis of Qinghai’s Industrial Structure Characteristics and Sustainable Development

1) Since 2012, the comprehensive strength of Qinghai’s national economy has entered a period of rapid development. Driven by the dual core of the secondary industry and the tertiary industry, the overall economy has driven the province’s economy to maintain rapid development. The industrial structure has gradually shown the characteristics of “1-2-3” benign development, and has gradually formed that agriculture is dominated by animal husbandry and the development of specialty agricultural products, industry is represented by resources such as salt, coal, aluminum, and copper, and the service industry is represented by tourism industry as a characteristic national economic system. Judging from the indicators from 2012 to 2021, the regional GDP has achieved substantial growth, with the total GDP increasing from 152.848 billion to 334.633 billion in 2021. In

just ten years, the total economic volume has more than doubled, and the GDP of the primary industry has increased from 17.424 billion increased to 35.265 billion, the secondary industry GDP increased from 62.019 billion to 133.261 billion, and the tertiary industry GDP increased from 73.405 billion to 166.137 billion (Table 1).

2) From 1980 to 2019, the total output of Qinghai's three major industries has achieved a leap from quantitative change to qualitative change. The total output increased from 3.718 billion yuan to 782.64 billion yuan, and the total output of the primary industry increased from 777 million yuan to 44.723 billion yuan, the secondary industry increased from 2.151 billion to 456.008 billion yuan, and the tertiary industry increased from 790 million to 281.919 billion yuan. The output of the three major industries has achieved substantial growth; the ratio of the three major industries has changed from 20.90:57.85:21.25 to 5.71:58.27:36.02, showing that the proportion of the primary industry is decreasing year by year, while the proportion of the secondary industry has increased to maintain a stable growth trend and account for In the main position, the tertiary industry has

Table 1. Some indicators of the total volume and speed of national economic and social development in Qinghai Province in major years.

	Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Regional gross product GDP (unit 100 million yuan)	Total	1528.48	1713.31	1847.72	2011.02	2258	2465.11	2748	2941.07	3009.81	3346.63
	primary industry	174.24	204.72	215.93	208.93	221.19	238.41	268.10	301.90	337.99	352.65
	Secondary industry	620.19	680.96	714.81	761.13	867.68	975.67	1093.72	1153.92	1143.20	1332.61
	Tertiary industry	734.05	827.63	916.98	1040.96	1169.32	1251.03	1386.18	1485.25	1528.62	1661.37

Data source: Qinghai Statistical Bureau "Qinghai Statistical Yearbook".

Table 2. Total output in major years (100 million yuan).

Year	Total Output	Primary Industry	Secondary Industry	Tertiary Industry	Primary industry Proportion (%)	Primary Industry Proportion (%)	Tertiary Industry Proportion (%)
1980	37.18	7.77	21.51	7.9	20.90	57.85	21.25
1985	62.18	12.25	35.27	14.66	19.70	56.72	23.58
1990	144.62	24.53	71.29	48.8	16.96	49.29	33.74
1995	396.79	55.1	197.35	144.34	13.89	49.74	36.38
2000	700.75	56.99	362.94	280.82	8.13	51.79	40.07
2005	1351.15	89.95	769.22	491.98	6.66	56.93	36.41
2010	3097.63	197.42	1787.76	1112.45	6.37	57.71	35.91
2015	5595.73	313.58	3271.89	2010.26	5.60	58.47	35.92
2019	7826.4	447.23	4560.08	2819.09	5.71	58.27	36.02

Data source: Qinghai Statistical Bureau "Qinghai Statistical Yearbook".

grown significantly, and the proportion of the industry has generally shown an increasing trend, making a greater contribution to the economy; the three major industries have realized the transformation of the driving force for economic growth in their development (Table 2).

3) Judging from the three industry contribution rates announced from 1990 to 2021, the contribution rate of the primary industry dropped from 27.34% to 8.79% in 2021, the contribution rate of the secondary industry increased from 26.56 to 43.31%, and the contribution rate of the tertiary industry increased from 46.09% to 47.9%. The main feature is that the contribution rate of the primary industry has declined every year. In the past ten years, the main contribution rate has fluctuated between 4% - 8%; the contribution rate of the secondary industry has been stable at around 40%, reflecting the role of “ballast stone” for economic growth; the contribution rate of the tertiary industry has maintained at a fluctuation of 50%; overall, the contribution rate of the economic structure has maintained a stable proportion of healthy development (Table 3).

4) Looking at the energy consumption structure of Qinghai (Table 4), the total energy consumption from 1990 to 2021 increased from 5.0435 million tons to 46.9497 million tons of standard coal coefficient, an increase of more than 9 times. In 1990, the proportions of coal, oil, natural gas, and electricity consumption were respectively 51.54%, 12.47%, 1.03% and 32.97%. Coal consumption accounts for more than half of the total energy consumption, which means that energy consumption is highly dependent on coal in terms of energy supply. Coal is one of the main sources of carbon emissions, and coal consumption has a high proportion. Challenges to climate change and global warming, which will have negative impacts on the environment and public health, mean the region needs more energy transition and a diversified energy mix, reducing reliance on coal. From 2010 to 2021, the proportion of coal consumption has shown a downward trend year by year. The proportion of coal in total energy consumption has dropped from 34.14% to 28.73% in 2021, and the proportion of oil consumption has

Table 3. Contribution rate of three industries (%).

Year	Gross product	Primary Industry	Secondary Industry	Tertiary Industry	Industry
1990	100	27.34	26.56	46.09	4.71
1995	100	-1.35	44.33	57.01	37.87
2000	100	-7.19	52.52	54.67	35.91
2005	100	5.14	47.82	47.04	42.85
2010	100	4.2	58.83	36.97	45.17
2015	100	5.84	42.4	51.76	27.88
2020	100	30.14	67.45	2.41	8.71
2021	100	8.79	43.31	47.9	40.72

Data source: Qinghai Statistical Bureau “Qinghai Statistical Yearbook”.

increased from 7.61% to 10.2%, indicating that oil consumption increased slightly. It means that economic growth and industrial demand are rising or energy transformation is not fast enough. However, the growth of oil consumption represents an increase in carbon emission pressure and brings certain pressure on the ecological environment; In 2021, coal, oil, natural gas, and electricity the ratio is 28.73%, 10.2%: 14.59%: 46.48%. The energy structure has changed significantly, indicating that fossil energy accounts for a high proportion of the overall energy consumption structure and is still not clean enough. The pressure for carbon reduction cannot be underestimated. The proportion of natural gas and electricity consumption continues to increase, while the proportion of oil and coal consumption decreases significantly. Due to the decrease in the proportion of the two, carbon emissions gradually fall back. The proportion of electricity consumption increases to 46.48%, which reflects the significant level of development and utilization of clean energy. The significant increase also shows that the energy consumption structure is gradually being optimized. Natural gas consumption has increased from 11.21% to 15%, and electricity consumption has increased from 32.97% in 1990 to 2021, indicating that the use of clean energy has further increased. However, due to various factors, there are some thermal power plants in Qinghai, and there is still the possibility of increased carbon emissions and pollution in power production.

To sum up, Qinghai's economy is subject to geographical conditions, development stage, resource endowment and technological level and many other factors. The energy consumption structure shows the characteristics of high resource consumption, high coal consumption, low resource utilization rate, and the industrial structure is biased towards the other. It is thicker than short and is still in the period of accelerated urbanization and industrialization. In addition to the above problems, Qinghai's economy also has small economic scale, insufficient industrial development correlation, weak regional economic linkage, and "isolated island style" development of regional industries. Therefore, according to Qinghai's industry, it is necessary to follow the characteristics of regional

Table 4. Total consumption of energy and Its composition (1990-2021).

Year	Total Energy Consumption (10 000 tons of SCE)	As Percentage of Total Energy Consumption (%)			
		Coal	Crude Oil	Natural Gas	Electric Power
1990	504.35	51.54	12.47	1.03	32.97
2010	2814.57	34.14	7.61	11.21	47.04
2011	3145.28	28.58	10.68	12.97	47.77
2015 (before revision)	4134.11	32.53	8.52	14.28	44.67
2015 (after revision)	4124.97	31.6	9.11	14.75	44.54
2021	4694.47	28.73	10.2	14.59	46.48

Data source: Qinghai Statistical Bureau "Qinghai Statistical Yearbook".

economic development, industrial structure characteristics, and energy consumption structure proportions to optimize and adjust the economic industrial structure.

The orientation of regional industrial structure optimization and adjustment can generally be divided into three basic types according to their economic maturity: 1) Resource-oriented that is, focusing on the development of natural resources, with resource-based industries taking the dominant position. 2) Structure-oriented type that is, establishing an industrial structure with leading industries as the core and coordinated development of natural resource development and processing and manufacturing until processing and manufacturing dominate. 3) Technology-oriented, even if the industrial structure changes to a high-tech direction, that is, during the structural adjustment, the proportion of high-tech industries in the entire industrial structure will be greatly increased until it takes a dominant position.

Qinghai should first develop a structure-oriented sustainable development model, that is, establish an industrial structure with leading industries as the core. An industrial structure with coordinated development of natural resource development and processing and manufacturing will lead to a sustainable economy in which processing and manufacturing dominate. After completing this stage, the economy will develop toward a technology-oriented economy. Balanced development, green development and sustainable development have become one of the main goals of economic development for countries and regions in the world today. Only on this basis can more long-term and stable economic growth be achieved.

4. Problems and Development Bottlenecks in the Current Industrial Structure of Qinghai Province

1) Research shows that plateau climate change is characterized by warming and wetting, permafrost degradation, and intensified grassland degradation. These are the main features of land surface environmental deterioration. Overgrazing is the main factor causing carbon loss in alpine meadows; overexploitation and unsustainable. The economic model has a negative impact on the environment and damages the health of the ecosystem [10]. The Ministry of Industry and Information Technology issued the “14th Five-Year Plan for Industrial Green Development” in December 2021, which made clear requirements for industrial structure, production methods, green and low-carbon technology and equipment, energy resource utilization efficiency, etc. Qinghai Province’s industrial structure is relatively single, lack of diversification and the development of high value-added industries, some enterprises in traditional high-carbon emission industries may be at a disadvantage in competition. If these enterprises cannot adjust and transform in time, their competitiveness may decline or even close impact on the local economy.

2) The three major industries have weak ability to attract investment.

Chinese scholar Lu Minghong [11] found that GDP, market economy development level, transportation and service infrastructure, preferential policies and other factors have a significant relationship with attracting foreign investment, mainly from the international economic arrangements, economic systems, and legal systems among institutional factors. The four types of factors including business operation convenience, attitude towards foreign investment, and degree of economic freedom were found to be the main factors attracting foreign direct investment. Qinghai province is located in a remote area in the west, with relatively difficult geographical conditions. Most of its land resources are grasslands, deserts and high mountains. There are resource constraints and less available arable land, which limits the development and investment of agricultural and some industrial projects. Inconvenient transportation seriously affects investment willingness. There is a lack of developed infrastructure and convenient transportation networks. There are natural geographical barriers between various cities and states, making it difficult to form industrial cooperation, including construction in transportation, communications, energy, etc., which requires more Infrastructure investment to support economic development requires a large amount of capital investment. Small industries, immature markets, insufficient technological innovation capabilities, and unfavorable investment environments result in insufficient industrial investment. Investment in the state-owned economy, collective economy, private individual economy and other economies is unstable (Table 5). Fixed asset investment has always been the locomotive of China's economic development. Relying on rapid monetary expansion and continued debt growth, on the one hand, it has continuously reduced labor's share of national income, and on the other hand, fixed asset investment has continued to be ahead of the growth of the national economy. Boost economic growth by investing ahead of demand. From 2010 to 2020, the growth rate of fixed investment in Qinghai Province has shown a gradual downward trend, from 33.5% in 2010 to 5% in 2019. The intensity of relying on investment to promote economic growth has gradually weakened, indicating the attractiveness of economic growth is weakening, the pressure on economic growth is gradually increasing, which will increase the pressure on enterprises to transform, and also indicates a good opportunity for the economic development model to shift from an investment-driven to a consumption-driven model. The -5% growth rate of fixed asset investment in 2020 should be a watershed or turning point for macroeconomic policies that use the rapid growth of fixed asset investment to maintain a certain growth rate of GDP since the epidemic. In the fixed asset investment of the state-owned economy, the investment growth rate has been stable at around 30%, and the state-owned economy has become a key force in stabilizing the macroeconomic market. Private investment (collective economy, Private and Self-employed individual, other economies) is an important supporting force for stabilizing growth, adjusting structure, and promoting employment. The investment rate of private capital in fixed assets fluctuates, sometimes high and sometimes low, and is extremely unstable. The instability of private capital

Table 5. Fixed asset investment in the whole society from 2010 to 2020 (by economic type) (unit: %).

Year	Growth Over the Previous Year	State-owned	Collective-owned	Private and Self-employed Individual	Others
2010	33.5	29.6	11.7	74.4	28.2
2011	34.2	34.1	9.3	12.3	43.8
2012	33.9	30.6	-8.1	59	31.8
2013	25.2	26.8	31.6	47.9	15
2014	21	21.5	-3.2	44.7	10
2015	12.3	32.5	9.5	1.2	-11
2016	10.9	-1	-48.1	28	29
2017	10.3	8.9	29.4	9.2	13.1
2018	7.3	15.8	-20.5	11.7	-8.9
2019	5	-0.1	152.1	-8	23.8
2020	-12.2	-18.6	-72.5	-18.1	2.3

Data source: Qinghai Statistical Bureau “Qinghai Statistical Yearbook”.

investment is the first signal of a turning point in fixed asset investment. The instability of capital investment will be passed on to state-owned capital.

The growth of the secondary industry, especially the rapid growth of the heavy and chemical industry, is largely achieved by the investment of capital and other production factors. Moreover, the province’s industrial growth is mainly supported by bank credit funds. This is a kind of “borrowed growth.” Industrial growth is increasingly dependent on capital investment, which also makes fixed asset investment continue to rise. Because such growth is a direct financing that increases corporate costs, when investment efficiency is not high, over-investment can easily lead to a large increase in bank bad debts; and capital is a very precious and scarce resource. Must be highly cherished, Qinghai must not adopt a growth model that relies solely on investment. If investment decisions are wrong or the bubble bursts, it will cause risks to the financial system; At the same time, over-development of heavy industry and over-reliance on Qinghai Province’s natural resources will cause Qinghai Province’s industrial enterprises to relax their efforts in technological innovation and efficiency improvement. If enterprises are content to do simple processing and rely on natural resources and capital investment to make money, this will lead to low industrial employment capacity and affect the entire industrial structure adjustment process. From the perspective of regional economic distribution characteristics, Xining City’s GDP and fixed asset investment are close to half. Except for Xining, the industries in Haidong, Hainan, Haixi, and Haibei states exist in an isolated island style, unable to form supporting facilities and collaborations, and have become seriously sinking. The development depression has made the investment cost of enterprises in this area higher, resulting in the investment rate declining in recent years, affecting the efficiency and level of industrial improvement, affecting product quality, and dragging down the process of developing green industry.

3) The structure of the three major industries is unreasonable and the industrial level is low.

From the perspective of the internal structure of the primary industry, agriculture and animal husbandry are important economic pillars. Traditional agriculture and animal husbandry account for a large proportion. Most agricultural and pastoral areas are still in the decentralized traditional production and management mode. The structure is single, agriculture and animal husbandry production are extensive, the scale of industrialized operations is still small, and the level of planting and breeding technology is relatively backward. Agricultural crops are grown on a certain scale, such as rapeseed, vegetables and other cash crops, and animal husbandry is mainly based on plateau characteristic animal husbandry such as yak and Tibetan sheep, which are in the early stages of animal husbandry development. Agricultural and animal husbandry production in some areas is still in a relatively primitive and backward state. The “grabbing” management method of land and the rejection of advanced technologies and planting methods have low ecological benefits, leading to serious degradation of land and pastures, and the ability to withstand natural disasters lower. At the same time, there is not much attention paid to carbon emissions. The bottom line of non-carbon dioxide greenhouse gas emissions from agriculture and animal husbandry is unclear, and emissions accounting methods are immature. This has led to an accurate assessment of the ability, intensity, and pollution capacity of agricultural carbon dioxide emissions in the agricultural field.

Secondly, the development of industries within the industry is unbalanced, and the proportion of light and heavy industries is uncoordinated. The industrial structure focuses on heavy industry, with a high proportion of resource-based heavy industry enterprises such as steel, coal, metallurgy, and chemicals. The biggest characteristics of heavy industry are that it requires large investment, the industrial structure relies heavily on fossil energy, the production and construction cycle is long, the structural transformation capability is not strong, and it occupies a lot of land, consumes water resources, and has the characteristics of high energy consumption and high emissions. It has strong ability to generate “three wastes” (waste gas, waste water, and solid waste). The industrial system of chemical industry, metallurgy, non-ferrous metals and Juche is the main contributor to the province’s GDP and the leader of carbon emissions. The objective reality has pushed up Qinghai’s total carbon emissions. The experience of countries around the world, including China, tells us that heavy industry requires very high technical content and requires employees to have strong cultural qualities and innovative abilities, but at the same time its ability to absorb employment is very low. Due to historical reasons, Qinghai’s excessive development of heavy industry will inevitably increase the difficulty of solving the employment problem. The excessive development of heavy industry will cause serious employment problems. The excessive development of heavy industry will make it difficult to optimize and upgrade the industrial structure. In particular, the development of the ten advantageous and characteristic industries is unbalanced.

In 2020, the top ten advantageous industries accounted for 72.98% of the total industrial output value of Qinghai Province, becoming the pillar industries of Qinghai Province's economic development; the top five among the top ten advantageous characteristic industries were the non-ferrous metal industry accounting for 28.61%, and the salt lake chemical industry accounting for 9.75%. %, the new material industry accounts for 8.31%, and the new energy industry accounts for 7.60%. The equipment manufacturing industry accounts for 7.52%. Among them, high energy-consuming and resource-intensive industries such as coal chemical industry, oil and gas chemical industry, steel industry, and equipment manufacturing industry account for 17.71%. On the contrary, the development of non-resource-based industries lags behind. New energy, new materials and biological industries account for less than 17% of the total industrial output value, accounting for 16.93%. Among the total industrial output value, only the new energy industry has an absolute volume ratio of There was a slight increase in the year, while the rest of the industries were in decline. In the industrial added value, the non-ferrous metal industry and the coal chemical industry increased compared with the previous year, the new energy industry remained the same, and the other industries all declined, indicating that the new energy industry and the non-ferrous metal industry have become new advantageous growth points, but as new energy and non-ferrous metal industries Resource development and the growth of the coal chemical industry indicate

Table 6. The growth rate of the ten superior industries output value and added value of industry increased (2020) (Unit: 100 million yuan, %).

Item	Gross Industrial Output Value		Value-added of Industry Growth Over the Previous Year	Proportion of top ten superior industries (%)
	Absolute Amount	Growth Over the Previous Year		
Industrial Enterprises above Designated Size	2307.14	-2.1	-0.2	100
New Energy Industrial	175.23	0.4	0	7.60
New Materials Industry	191.65	-14.5	-9.8	8.31
Salt Lake Chemical	224.84	-21.2	-12	9.75
Non-ferrous Metals	660.03	13.4	14.1	28.61
Coal Chemical	26.38	-1.2	3.1	1.14
Oil and Gas Chemical	63.13	-20.8	-10.8	2.74
Bio-industry	23.7	-19.8	-18.5	1.03
Iron and Steel Industry	145.41	-6.7	-2.4	6.30
Equipment Manufacturing Industry	173.59	-6.2	-5.3	7.52

Data source: Qinghai Statistical Bureau "Qinghai Statistical Yearbook".

*represents no data. Because there was no original data in the original table of the top ten advantageous industries of the Bureau of Statistics, but the original table was quoted when quoting it. Later, it was found that the data was useless and the entire row was deleted. Now please review the teacher to delete this paragraph. Thank you.

that pressure to reduce carbon emissions still exists (Table 6).

The tertiary industry, first of all, has obvious characteristics of a single industrial structure. Traditional industries account for a large proportion, mainly agriculture, animal husbandry, forestry and traditional manufacturing. The development of the service industry is relatively weak. The industrial structure lacks diversity. The urban-rural gap leads to regional differences. The level of economic development varies greatly between different regions. The development of the service industry is relatively lagging behind. The regional economic development is uneven, the development between urban and rural areas is unbalanced, and the infrastructure construction in some areas is relatively lagging behind, which affects the development of the service industry. The development of the service industry is restricted by the imperfect supporting facilities such as logistics, which limits the development of the service industry. Its ability to expand in scale and provide a wider range of services. Service industry resources are concentrated in cities, and rural areas are undersupplied with services. Secondly, human resources, technological innovation, and talent introduction are insufficient. At the same time, the market demand structure is single. Due to geographical and economic conditions, the service industry faces the problem of a single market demand structure. It is difficult to expand diversified service areas, attract high-quality talents and the limited capabilities of professional talents have restricted the development and improvement of the service industry. Insufficient scientific and technological support and relatively backward technological innovation levels have restricted the technological upgrading and innovative development of the service industry; supply-side structural problems include low service quality and insufficient service innovation. The service quality of some service industry enterprises is uneven, and service levels need to be improved. Quality management level, the service industry lacks innovation and competitiveness, and more attention needs to be paid to innovative service models and formats.

4) “Altitude sickness” has caused a decline in efficiency, and technology, talent, and carbon trading support need to be improved.

Low-carbon technologies such as hydrogen + electricity + coal hybrid steel-making, green hydrogen and carbon dioxide synthesis to produce methanol have been demonstrated and applied. However, the average altitude of Qinghai is 4,005 meters, and the average air oxygen content is less than 58%. The efficiency of motors, transmissions and other machinery is more than 10% lower than that in plain areas. Using the same technical equipment to produce the same product consumes about 10% more energy, and the carbon emissions are also will increase accordingly. The ecological environment protection team has a small number of personnel and heavy tasks. The professional and technical level of service agencies is uneven. It lacks technical and talent support in carbon emission accounting and verification. It also lacks professional capabilities and decision-making experience, which will also cause difficulties in the implementation of the project. The existing environmental protection team has insufficient sup-

port capabilities, and the quality of carbon emission data and management capabilities need to be improved urgently. The carbon sink trading system still needs to be improved. A “one-stop” carbon trading comprehensive service platform including carbon emission registration, inquiry, trading, custody, financing, disclosure, training, etc. has not yet been established. The diversified and market-oriented value realization mechanism of forest and grass carbon sinks has not yet been formed, and the empowerment of carbon financial products is insufficient, which restricts the development of carbon sink transactions in the province.

5. Qinghai Province’s Industrial Structure Adjustment Strategy

Economic geography has long paid attention to regional industrial evolution issues [12], industrial structural adjustment requires sustainable transformation and development in the direction of sustainability, but “sustainable development” is not the same as “sustainable transformation”. The former emphasizes the coordinated development of natural ecology and social economy based on people, while the latter refers to Systemic shifts in human production and consumption patterns [13] [14], the connotation of green development is the development of low-carbon economy, circular economy and green economy [15], Transformation is a process of co-evolution of multi-dimensional elements, including the interdependent development of technology, market, users, infrastructure, systems, policies, etc. [16]. Transformation relies on long-term social construction and takes years or even decades from emergence to maturity [17]

1) Adhere to the path of low-carbon greening and rationally reduce and decarbonize.

Qinghai should give full play to Qinghai’s clean energy advantages, In the context of the national carbon peak and carbon neutrality strategy, taking serving the national carbon peak and carbon neutrality goals as our own responsibility, we will promote “double decoupling” with “dual leadership”, give full play to the advantages of clean energy, optimize the energy structure, increase financial support for clean energy, ecological protection and other low-carbon and zero-emission projects, and build a circular, green, low-emission and low-pollution economic system reduce the proportion of fossil energy consumption and promote the continuous optimization of the energy structure. it is necessary to comprehensively consider the actual situation of Qinghai’s industrial development, industrial structure, energy structure, etc. avoid decoupling development between economic growth and low-carbonization, and guide various entities to invest in low-carbon technological innovation through promotion, guarantees, etc. actively explore and discover new energy sources such as renewable energy and fossil energy with low carbon emission coefficients, while focusing on the research and development of carbon emission reduction technologies to ensure the adequacy and continuity of technology investment focus on cultivating and developing sustainable leading exhibition industries, form the pillar and leader

of Qinghai's green economic development and strive to build a modern industrial system. In particular, we will build a low-carbon recycling industrial system and accelerate the development of environmentally friendly emerging industries such as new energy, new materials, and deep processing of special resources.

2) Accelerate the formulation and improvement of "dual carbon" supporting policy systems.

It is recommended to continuously optimize and improve scientific research, systems, structures and other aspects. Strengthen scientific research in the field of climate change. Improve the ecological meteorological monitoring, evaluation and early warning system, increase research on the relationship between regional climate change and ecological change, and jointly carry out multi-disciplinary technical research, carry out localized ecosystem carbon sink measurement and monitoring research to objectively reflect the actual carbon emissions in plateau areas. Comprehensively and objectively assess total carbon emissions from 2023 to 2030, formulate a special plan for addressing climate change during the "14th Five-Year Plan", continue to fight against pollution, and formulate policies and systems such as a synergistic implementation plan for pollution reduction and carbon reduction. In accordance with relevant national measurement methods and standards, Carry out the construction, development and project reserve of Qinghai forestry carbon sequestration and clean energy voluntary emission reduction projects, actively explore cooperation mechanisms with carbon trading institutions outside the province, and promote the listing and trading of Qinghai voluntary emission reduction projects. Promote the improvement of "green electricity" trading rules and encourage financial institutions to establish carbon financial products such as carbon trusts, carbon funds, and carbon bonds.

3) Taking Qinghai's advantageous and characteristic resources as the main body

Develop a green industrial structure; Develop characteristic agriculture, optimize the internal structure of agriculture, create an export center for green organic agricultural and livestock products, and sing the brand of "Ecological Qinghai, Green Agriculture and Animal Husbandry", strengthen the protection and utilization of plateau characteristic germplasm resources, mobilize the province's efforts to build a leading enterprise under the concept of green development, promote the intensive processing of agricultural and livestock products, build a characteristic green agricultural and livestock product export and trading platform, build a demonstration province for green organic agricultural and livestock products.

To improve the industrial economic policy system, first of all, formulate policies that are conducive to industrial adjustment and upgrading, provide fiscal, taxation and financial support, and encourage technological transformation and innovative development of enterprises; give full play to the characteristics of advantageous industries and utilize Qinghai's abundant solar and wind energy resources to develop solar energy, wind energy power generation projects, reduce

dependence on traditional fossil energy, and promote the construction of a clean energy industry chain. Continue to focus on the development of green industries such as clean energy, new energy vehicles, and environmental protection technology; focus on controlling emissions from high-carbon-emitting industries such as thermal power, steel, cement, coal chemicals, oil and gas chemicals, and electrolytic aluminum. Actively guide traditional industries to agglomerate into low-carbon industries with high added value and low emissions, and strictly control energy consumption in high-energy-consuming and high-pollution industries. promote the transformation and upgrading of traditional industries such as metallurgy, nonferrous metals, and chemicals, encourage enterprises to adopt energy-saving and emission-reduction technologies, optimize production processes, and reduce emissions, improve resource utilization efficiency, enhance industrial energy efficiency, improve clean production and comprehensive utilization of resources, and prevent a vicious increase in carbon emissions, Increase investment in scientific and technological innovation, support research and development and the transformation of technological achievements, Promote industrial upgrading and structural optimization; promote the development of industrial intelligence, strengthen the application of information technology in industrial production, and improve production efficiency and quality; secondly, improve the market access mechanism, lower market access thresholds, and establish a unified market supervision mechanism, Improve the level of market supervision, maintain market order, provide more policy support to small and micro enterprises and innovative enterprises, encourage them to participate in market competition, and promote the optimization and upgrading of the economic structure. Promote digitalization and informatization construction, establish a unified data platform and information sharing mechanism, Improve the transparency and efficiency of market information; increase investment in talent training, encourage the introduction of high-level talents, and support technological innovation and industrial development.

4) Vigorously develop the modern sustainable development service industry.

With the acceleration of economic and legal development and marketization, the demand for services from the production sector has increased, forming a strong support for green industries and guiding the real estate industry to take the road of quality. The real economy is the foundation and finance is the blood. Without the support of a complete modern financial system, there will be no healthy development of the real economy. We should actively build a full-chain service network for scientific and technological innovation. The government should formulate relevant consumption support policies and provide financial support and taxation. Discounts to attract corporate investment and innovative development. As Qinghai's economy develops and residents' income levels increase, residents' consumption demand for services will gradually increase. Accelerate the establishment of a high-end characteristic business circle, focus on strengthening the modern business industry, cultivate and develop the socialized

health and elderly care service industry, promote health and wellness consumption, develop health and wellness products and service industries; comprehensively enhance consumption momentum, accelerate the cultivation of new consumption, develop green consumption, and promote cultural tourism consumption, Utilize Qinghai's unique natural landscape and cultural resources to strengthen the protection and development of cultural and tourism resources, promote the development of the cultural tourism industry, attract more tourists to spend, seize the opportunity of the information service industry, accelerate the development of the modern logistics industry, and improve the introduction of talents and training mechanism, establish a sound after-sales service mechanism, enhance consumer confidence, improve the protection of consumer rights, establish a sound consumer rights protection mechanism, strengthen the protection of consumer rights, enhance consumer confidence, and increase their enthusiasm for consumption.

6. Summary and Outlook

Achieving sustainable economic development in Qinghai through industrial structure adjustment and optimization is an urgent task. The adjustment of industrial structure is mainly committed to the transformation and upgrading of green industries such as clean energy and eco-tourism to reduce the impact on the environment. The economy of Qinghai Province is in a period of high growth and rapid changes in its industrial structure, and in the future industrial restructuring it will focus on sustainable development, innovation-driven and ecological protection, striving to build a more diversified, green and efficient industrial development model. A diversified and balanced industrial structure would help to improve economic stability and resilience, promote job growth and foster economic innovation and development; in terms of industrial restructuring, optimizing the agricultural structure to promote the modernization of agriculture and the development of agriculture with special characteristics, increasing the added value of agricultural products, strengthening scientific and technological innovation in agriculture, and promoting the overall development of agriculture and the rural economy. Rich mineral and clean energy resources will strongly help resource-based industries to green ecological industry transformation, with the new development concept to lead the intensive development of clean energy, green sharing to promote economic and social transformation of low carbon, to optimize the layout to create a multifaceted synergistic high efficiency energy storage system, to promote the upgrading of the industry with technical standard innovation, to deepen the energy revolution to build a market-oriented development system, and to promote the synergistic development of clean energy and the ecological environment. In practice, sustainability needs to be approached from multiple perspectives, including promoting the use of clean and renewable energy, reducing carbon emissions, promoting a circular economy and resource recycling, strengthening social inclusion, improving education

and health, and establishing a good governance system, etc., is a comprehensive concept that requires cooperation and joint efforts in various fields to achieve.

Conflicts of Interest

The authors declare no conflicts of interest.

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