

Analysis on the transformation and development of coal industry in Shanxi Province

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Abstract: Shanxi Province is rich in coal resources, which is an important energy base and an old industrial base in China. Relying on the unique resource advantages, the coal industry bears the mission and task of leading the economy, which has accumulated huge capital for the regional development of Shanxi Province and laid a solid foundation for the industrial development and economic excellence of Shanxi Province. Since the reform and opening up, the coal industry in Shanxi Province has begun to bid farewell to the extensive production organization mode of high energy consumption and high pollution, and to seek a way of transformation to adapt to The Times and seek for development, as the coal resources are gradually exhausted, the coal production sector has excess capacity, and the environmental pressure is increasing. At present, the coal industry has entered a critical stage of transformation in the new era. It is of great significance to explore how the coal industry can further promote the transformation and development under the new stage and at the new historical starting point to consolidate the leading position of the coal industry in Shanxi Province and promote the prosperity of the energy base. This article through the relevant theoretical research industry transformation, and using the method of combining quantitative analysis and qualitative analysis in view of the development of coal industry transformation in the new period of the three factors - science and technology innovation, factors of production, market demand to make the current development of shanxi coal industry transformation, and has carried on the three major factors for the development of the transformation mechanism of the effect of constraints. Finally, this paper systematically puts forward the policy Suggestions for accelerating the transformation of coal industry and promoting its development to a new level, such as strengthening the innovation of industrial science and technology, optimizing the allocation of factors of production and optimizing the extension of industrial chain.

1. Guide on

1.1 Background and significance of topic selection

1.1.1 Background of topic selection

Coal is an important industrial raw material in our country and the most abundant mineral resource in our country. It occupies a large proportion in our country's energy industry. The coal industry has also become a traditional industry and basic industry of the national economy, playing an important role in promoting economic and social development and social progress. With the increasing demand for energy from the development of the national economy, the contribution rate of the development of the coal industry to the development of the national economy and society continues to increase. However, in recent years, as coal resources have gradually depleted and the proportion of net imported raw coal has increased, resulting in overcapacity in some coal production sectors, China's coal market has continued to slump, small and medium-sized coal companies have low management levels, backward production methods, and resource constraints. growing, highlighting the structural problems of the coal industry, and many other factors make the present stage of sustainable development face serious challenges war. Since 2013 , the Chinese government has been committed to promoting the sustainable development of resource-based cities

on the policy agenda of ensuring the country's energy and resource security, transforming the mode of economic development, advancing new roads to industrialization and urbanization, and building a resource-saving and environment-friendly society. With clear requirements, the coal industry is the most important thing in the transformation of Shanxi's resource cities.

With "Shanxi coal ignites half of the country's lights", Shanxi, relying on its unique advantages in coal resources and the vigorous development of the coal industry, has made great contributions to safeguarding national energy security and promoting the development of Shanxi's national economy and social undertakings. However, Shanxi is prosperous because of coal, but also because of coal. Vitality of the Chinese coal market decline and the recent "green economy" trend to the coal industry as the main pillar industry development model of the drawbacks of Japan benefits highlighted. The economy of Shanxi Province is over-reliant on coal resources, forming a super-heavy economic structure and a deformed industrial pattern dominated by the coal industry with an overweight secondary industry. The unreasonable industrial structure suppressed the process of industrial diversification in Shanxi Province, making it very weak in resisting market risks. At the same time, the singularity and solidification of actions has led to the closed and conservative thinking of Shanxi people. The long-term large-scale, high-intensity, and predatory coal mining has confined Shanxi people's ideas and concepts, and lacks the courage and confidence to pioneer, innovate, and be aggressive. In view of this, the Shanxi Provincial Party Committee and the Provincial Government led the people of the province to seize opportunities, deepen reforms, actively explore the adjustment of industrial structure and explore the transformation and development path, and deepen the transformation path step by step. 2010 Nian 12 Yue 1 , the State Council approved the establishment of the "mountain national resource-based economy of comprehensive reform pilot area of West Province", Shanxi province has become China's first domain, comprehensive, systematic national comprehensive reform pilot area. Since the comprehensive reform Zone approved, Shanxi Province attaches great importance to focus on industrial restructuring, ecological restoration, urban and rural areas, improving people's livelihood four transformation tasks, formulated nearly 3 embodiment years, the deployment of 50 Xiang major reforms, 100 Xiang Major issues, 100 major projects, and 10 major issues of the " 5111 " key tasks have done a lot of fruitful work. 2019 Nian 5 Yue 30 , the "Opinions on Carrying out a comprehensive reform of the energy revolution in Shanxi" by the CPC Central Committee on the development of coal industry restructuring in Shanxi had another top-level design and strong support for the realization of Shanxi "coal boss" to "vanguard "The historic leap forward provides more favorable policy support.

1.1.2 Significance of topic selection

(1) Theoretical significance

In the process of research on the transformation and development of the coal industry in Shanxi Province, this article will integrate various theories of industrial economics, microeconomics, macroeconomics and other disciplines, and apply the endogenous growth theory to the analysis of innovative factors in the development of industrial transformation. Go, apply the demand-determining theory in Keynesian economics to the optimization of supply in industrial transformation and upgrading. In this way, combining multiple disciplines and multiple theories to analyze together in research has high academic value for the integration and communication of multiple disciplines and the promotion of the development of disciplinary theories. This paper comprehensively and systematically summarizes the relevant theories on the motivations, influencing factors, influencing mechanisms, and transformation development paths of industrial transformation and development in the existing research results at home and abroad, and has become a "national resource-based economic transformation comprehensive supporting reform pilot zone" in Shanxi Province. Under the general background of the "Opinions on the Pilot Program of the Comprehensive Reform of the Energy Revolution", it provides a theoretical basis for promoting the transformation and development of the coal industry in Shanxi Province in the new stage.

(2) Realistic significance

First, the transformation and upgrading of the coal industry is related to the lifeblood of Shanxi's economy, and research on the transformation of the coal industry plays a vital role in the healthy and sustainable development of Shanxi's economy. At present, my country's economic and social development has entered a new era, and the transformation and development of the coal industry has entered a new stage. The new era has new requirements, and the new stage has new actions. In the context of the establishment of the "National Resource-based Economy Transformation Comprehensive Supporting Reform Pilot Zone" and the adoption of the "Opinions on the Implementation of the Pilot Energy Revolution Comprehensive Reform Zone", the study of the transformation and development of the coal industry in Shanxi Province is of great practical significance to the regional economic transformation of Shanxi.

Second, the transformation and upgrading of the coal industry is related to the transformation and development of resource-intensive industries. Research on the transformation of the coal industry can play a demonstrative and leading role in the transformation and development of resource-intensive industries across the country. Shanxi Province is a typical representative of resource-based regions in my country. The transformation and upgrading of the coal industry as a pillar industry can provide experience and models for the transformation of resource-intensive industries in other regions, and has important leading and exemplary significance. Entering a new stage of historical development, the coal industry in Shanxi Province shoulders new missions and responsibilities. It needs to study new features under new conditions, actively explore new development paths, and focus on technological innovation and production in accordance with the current actual situation of transformation and development. In terms of factor allocation and market demand, efforts will be made to improve the effective competitiveness of Shanxi's coal industry and the development level of the industry, and make good use of the magic weapon of "first try, first try" to reflect Shanxi's responsibility and contribute to Shanxi's wisdom. Therefore, in a new historical development point, studying the transformation and development of the coal industry in Shanxi Province has practical significance for the construction of a resource-based economic transformation and development demonstration zone in Shanxi Province.

1.2 Literature review

1.2.1 Motivation of industrial transformation and development

In terms of the motivation of industrial transformation and development, Schumpeter (1912) put forward the theory of innovation in his monograph on economic development theory, expounding that the essence of industrial transformation is the driving force of innovation transformation, which is for the sustained development of the industry. When talking about economic development as the continuous realization of new combinations, Schumpeter pointed out five situations involved in innovation: first, adopting a new product; second, adopting a new production method; third, Opening up a new market; fourth, plundering or controlling a new source of supply of raw materials or semi-manufactured products; fifth, realizing a new organization of any kind of industry, such as creating a monopoly or breaking a Monopoly. Schumpeter's innovation theory system reveals that the essence and driving force of the current coal industry's pursuit of transformation and development is innovation, which is for the sustainable development of the industry, and also provides the basic direction for industrial transformation towards technological innovation. Kang Lingxiang (2016) believes that the intervention of local governments through industrial policies will cause the industrial transformation and upgrading of enterprises, thereby causing the transformation and upgrading of local industries. In his article, he emphasized the driving role of the government's industrial policy on the transformation and upgrading of local industries, and provided reference suggestions for the government's impetus for the transformation and upgrading of industries in other regions and the implementation of industrial policies. Diana HA Tsai. (2018) analyzed the dynamics of industrial development and structural changes and their impact on sustainable development. He believed that the motivation of industrial transformation was the pursuit of sustainable development, and took Taiwan's manufacturing industry as an example. Suggestions Various industries adopt

more sustainable measures to promote industrial development and structural changes. The scholar combined sustainable development and industrial transformation to do a model study, demonstrating that sustainable transformation and development can enhance corporate competitiveness and even core competitiveness. Song Jia (2018) conducted a research on the industrial transformation of resource-based cities in Heilongjiang Province, a region where the "resource curse" is severe, and proposed that the driving factors of industrial transformation are embodied in three aspects: market, government, and innovation, and selected industrial policy implementation, Seven variables of fiscal expenditure, labor supply, financial support, degree of marketization, R&D investment, and transformation of scientific and technological achievements are analyzed. Song Jia's analysis of the factors driving industrial transformation is more comprehensive, and the transformation of the steel industry and coal industry in Heilongjiang Province has reference value and guiding significance for the study of the transformation of the coal industry in Shanxi Province.

1.2.2 Influencing factors of industrial transformation and development

In terms of factors of industrial restructuring and development, Guo Jia, Fu Tao, Yang Qing (2015) from economic growth, production industry structure, environmental control three selected industrial transformation and upgrading of the structure of indicators to determine the coefficient of industrial restructuring, and based on the VAR model Yunnan Province conducted an analysis and concluded that social demand, population quality, technological progress and labor productivity are the influencing factors for the transformation and upgrading of Yunnan's industrial structure. Yu Zhiqian, Du Wenjie, and Zhang Han (2016) combined domestic and foreign research results and divided the factors affecting industrial transformation and upgrading into three categories: economic factors, social factors, and environmental factors. Among them, economic factors mainly include GDP and per capita income. , Economic structure and economic development efficiency, etc. Social factors mainly include infrastructure, mechanisms, social security, human resources, etc. Environmental factors mainly include ecological environment, technological innovation environment, etc. Six scholars comprehensively and systematically analyzed the influencing factors of industrial transformation and upgrading, which is conducive to the enrichment and development of industrial transformation and upgrading theories, can analyze economic, social and environmental factors in the process of industrial upgrading, and guide the industry to avoid restrictive factors happened.

1.2.3 Research on the path of transformation and development of industries

In the study of the path of industrial restructuring and development, Albu and Bell (1999) believes that the transformation and upgrading research industry needs to focus on the core competitiveness of the industry, to focus on other industries hard copy of core competencies and industry value; Gereff (1999) from the value of From the perspective of the chain, it is believed that industrial transformation and upgrading is a process of gradually moving towards more profitable capital and technology-intensive economic fields ; David C. wood (2003) analyzed the technological innovation in the Australian coal industry in the article. He made the Australian coal industry is located in the World reason the forefront of the industry because the exploration and application of new technologies, and the emphasis should continue to adopt new technologies to reduce the cost of the coal industry, thereby enhancing the competitiveness of the coal industry. Four scholars have put forward the two keywords of core competitiveness and new technology in the research of the path of industrial transformation, which conforms to the general law of the current industrial transformation and development, and can provide new technology development and competitiveness enhancement in the development of modern industrial transformation. Theoretical basis. Marinova Dora (2015) established a resource-based city transformation capability evaluation model based on case studies of Panzhihua and Dayeze two steel resource-based cities, taking the resource-based city transformation capability evaluation as the research object. The paper concluded that the local economy needs to develop emerging

industries in a low-carbon circular economy, rather than relying entirely on its limited natural resources. In order to achieve sustainable transformation, local governments need to adjust the economic environment, encourage foreign investment, and support the development of high-tech and sustainable industries. Marina D'ORA greater emphasis on the development of resource-based cities in transition process should pay more attention to sustainability, while emphasizing the important role government needs to play in the transition, to provide policy recommendations for resources cities. Yang Jianhua and Meng Xiufeng (2019) pointed out the need to deepen the structural reform of supply measurement in the process of transformation and development of the coal industry in Shanxi Province to correct the inefficiency, low-grade and low-quality problems caused by the distortion of factor allocation and build higher quality. A more efficient and sustainable modern coal economic system. The two scholars put forward the current development target requirements for optimizing the allocation of production factors of the coal industry, which has special significance for the specific industry of the coal industry.

1.2.4 Literature review

In summary, among the relevant literature on the development of industrial transformation, there are many documents that believe that innovation and sustainable development are the driving force of industrial transformation and upgrading in the research on the motivation of industrial transformation and development, and some documents are more inclined to comprehensively analyze industrial transformation. The driving factors of the industry, considering the market, government and innovation factors; in the research on the path of industrial transformation and development, many scholars conduct research on technological innovation and sustainable development, and combine innovation and sustainability with the promotion of industrial core competitiveness. It provides guidance for the target requirements and path selection of industrial transformation and development in the new era; in terms of the influencing factors of industrial transformation and development, it analyzes economic factors, social factors and environmental factors, and the analysis is more comprehensive, but it is aimed at the coal industry in Shanxi Province. There are relatively few or not comprehensive studies on the influence factors of the transformation and development under the new environment and new conditions, and the ideas and suggestions in the new period. Therefore, this article will analyze the influencing factors and impact mechanism of the transformation and development of the coal industry in the new era, and put forward specific and pertinent policy recommendations, and put forward realistic suggestions for the coal industry in Shanxi Province at a new historical starting point. Guiding opinions that are practical and realistic.

1.3 Research methods of the paper

Theoretical research. This article will use the industrial structure optimization theory in industrial economics, the endogenous growth theory in macroeconomics, and the production factor theory in microeconomics as the basis of argumentation, and provide policy recommendations for the transformation and development of the coal industry in Shanxi Province.

Combine qualitative analysis with quantitative analysis. This article uses qualitative analysis methods, relying on the current state of transformation and development of the coal industry in Shanxi Province and the latest information, to summarize and summarize the main factors affecting the transformation and development of the coal industry, and conduct a further comprehensive analysis of the factors affecting the coal industry in Shanxi Province. Case study; using quantitative analysis methods, based on statistical data related to the coal industry in Shanxi Province, to present the status quo of coal industry transformation in Shanxi Province; using a combination of quantitative analysis and qualitative analysis methods, through the analysis of the status quo based on statistics, Based on experience and characteristics of the status quo, descriptive policy recommendations were put forward.

2. Related concepts and theories of industrial transformation

2.1 Related concepts of industrial transformation

Industrial transformation refers to a country or region in a certain historical period, in accordance with the development status and trends of international and domestic economy, technology, etc., through the formulation of specific industry, fiscal and financial policies and measures, directly or indirectly or in all aspects of the existing industrial structure. Indirect adjustments, elimination of backward production methods, and concentration of efforts to cultivate new industrial models to adapt to the requirements of industrial development in the new era and achieve industrial structural upgrades. Industrial transformation is a complex and comprehensive process, which may involve the transformation of the system, the transfer and placement of labor, technological innovation, and the improvement of the environment. In general, the production industry including the transformation of industrial structure and organizational restructuring, industrial transformation study mainly refers to industrial restructuring.

The process of industrial transformation is actually a dynamic development process in which factors such as capital, labor, technology, etc. are re-allocated among various industries. From the current actual situation of economic development in Shanxi Province, realizing an effective combination of capital accumulation and technological innovation is important for the transformation of Shanxi's coal industry. The most critical.

2.2 Theory of Industrial Structure Optimization

Optimization of industrial structure refers to the proportion of demand following the reproduction process, by industry and between the industry restructuring, promoting inter-industry of the national economy to achieve coordinated development, adapt to the development of the national economy. Specifically, the optimization of industrial structure is a rationalization process of economic and technological links between industries, including quantitative proportional relationships, from incoordination to coordination; it is an advanced process of industrial structure evolving from a low level to a high level.

(1) Rationalization of industrial structure

Within each industry has maintained a ratio in line with industrial development law and internal relations, to ensure sustained and coordinated development of various industries, and between industry but also development. But it mainly refers to the enhancement of the coordination ability between industries and the improvement of the level of association, and the core content is industrial coordination. Industrial structure coordination is not an absolute balance between industries, but refers to a strong complementary and harmonious relationship between industries and the ability to transform each other.

(2) Advanced industrial structure

The advancement of the industrial structure refers to the development process of the industrial structure from a low-level state to a high-level state through technological progress, the process of continuously improving the overall development level of the industry, or the process of evolving the overall quality and efficiency to a higher level.

2.3 Endogenous growth theory

Endogenous refers to the fact that the new classical economic growth theory regards technology and other factors as exogenous given. The endogenous growth theory endogenizes factors such as technological progress and human capital, and puts their impact on output in a certain way. Forms are discussed within the production function. After considering these factors, the marginal output of factors no longer decreases, and the production function of firms or society may also experience increasing returns to scale. The core idea of the theory is that the economy can achieve sustained growth without relying on external forces, and endogenous technological progress is the decisive factor to ensure sustained economic growth. In the process of industrial transformation and development in the new era, endogenous technological progress is the fundamental driving force and core element of industrial upgrading and industrial development. In the process of industrial

transformation, a large amount of funds, advanced equipment, management methods, business concepts, high-tech and advanced applicable technologies are absorbed, and technological innovation, management innovation and system innovation are realized in the formation of industrial structure adjustment and upgrading mechanism. Optimization plays a key role. At the same time, endogenous technological progress can promote sustainable economic growth and provide a stronger material foundation for human capital accumulation and technological innovation.

2.4 Theory of production factors

The main factors of production theory is the theory of economics, but also the basic theory of technical economics. Since the 17th century, economists have continued to develop and extend the specific definitions and connotations of production factors. With the development and changes of the times, the content of production factors has gradually enriched.[2] . The economist Petty put forward in his book "Taxation Theory": "Land is the mother of wealth, and labor is the father of wealth and the active element", taking land and labor as the two elements of production. Say attributed land, labor, and capital to three elements of production, forming a ternary theory of production factors. Say believes that labor creates wages, capital creates interest, and land creates rent. Economist John Mueller also inherited Say's point of view and attributed the factors of production to land, labor and capital. Economics Home Marshall in the organization his book "Principles of Economics" as a fourth factor of production, labor, capital, land together constitute the "factors of production Quadruplicitism". Later economists turn technology as the fifth factor of production, which will "produce four elements" raised to "produce five elements". 20 century 80 's, the famous Chinese scholar Xu Shoubo put forward six kinds of resources - human, financial and material resources, capacity, natural forces and the force, known as the " factors of production six yuan theory " . In a typical Italian justice perspective, the basic factors of production including land, capital, labor, entrepreneurship four categories. Production factors are various social resources needed for social production and business activities, and are the basic factors that must be possessed in the process of maintaining the operation of the national economy and the production and operation of market entities. As for industrial transformation and development, the essence of industrial structure adjustment is to optimize the allocation of production factors between industries so as to maximize the economic and technological advantages of production factors. From the analysis of the principle of production factor combination, the adjustment of industrial structure is inseparable from the quality and quantity of production, and the movement of space and time. The purpose and task of studying the combination of production quality in industrial development is to determine a reasonable combination structure, so that the combination of production factors in the adjustment of industrial structure can fully meet the quality requirements, so as to obtain the maximum output with the minimum input. The purpose and task of studying the combination of production factors in industrial development is to select and determine a reasonable combination scale, so that the production factors are reasonably combined in quantity and equipped with coordination, so as to obtain the maximum output with the smallest input. From the analysis of the principle of the balance of production factors, the balance of production factors in the adjustment of industrial structure has the following characteristics: the first is the availability of production factors, and the second is the short-term balance of production factors. Many factors of production together form the organic whole of the industrial economy in a certain combination and intensity, and they are mutually dependent, interactive, interactive, and common to achieve output. Therefore, the production factors required for the operation of the industrial economy are necessary for the overall level of productivity. They are the basic conditions and material basis for the adjustment of the industrial structure. Analyzing from the principle of substitution of production factors, the adjustment of industrial structure is a process of the combined effect of labor capital and technology_.

3. The status quo and influencing factors of the transformation and development of the coal industry in Shanxi Province

3.1 Current status of coal industry transformation and development

3.1.1 The industrial structure continues to be optimized but not rationalized

Shanxi Province is an important energy base and an old industrial base in China. Its good natural resource endowment conditions have made Shanxi rely on the "one coal dominance" industrial structure to drive the economic development of the entire region for a long time, and the phenomenon of industrial structure imbalance is serious.

The indicator for measuring the rationalization of the industrial structure is the Theil index. According to the formula of the Theil index and the output value of the three industries and the number of employees in the three industries from 1990 to 2016 in 27 years, the calculation of the Theil index shows that the Theil index has undergone a first step. Up and down trend [4]. The reason is that since the reform and opening up of Shanxi Province, the coal industry has begun to rise, which has led to the rapid development of the secondary industry. However, at the beginning, there was no effective supervision and management mechanism. A large number of production factors and labor force poured into the secondary industry, which was caused by excessive expansion of the secondary industry. crowding-out effect, making the first, the tertiary industry development is limited, making irrational industrial structure, until 2007 Nian due to reduced coal resources and environmental pollution problems exacerbated by the government to limit the development of the coal industry, in turn, vigorously develop the tertiary industry , Thailand The Seoul index began to decline , and the industrial structure became more reasonable . 2011 -present, secondary industry output value ratio decreased rapidly, while the tertiary industry output value proportion was rising state.

At present, Shanxi Province is in the mid-stage of industrialization development , and the industrial structure presents an obvious three-industry progressive development trend, from " one , two , three " and " two, one, three" to a higher state of " two, three, one" . And develop to a higher level of " three, two, one" . This development trend is the trend of economic structural development. From the three industries in Shanxi value structure point of view (Figure 3-1), nearly 10 since the transition years of development and construction, the three industrial output continued to optimize the proportion of Shanxi Province, the proportion of primary industry has declined, the secondary industry in 2001 after years It has declined, especially to 38.70% in 2016 , and the proportion of the tertiary industry has risen rapidly. In 2015 , the industrial structure of Shanxi Province changed from “two, three, one” to “three, three, one” structure for the first time. In 2016 and 2017 , Shanxi Province maintained the “three, two, one” industrial structure unchanged, reflecting The effect of industrial structure optimization and adjustment in Shanxi Province is beginning to show. However, because the secondary industry has always been in the basic position of Shanxi's economy, it is the main source of its gross national product and the main growth contribution point. After 2014, the contribution rate of the tertiary industry exceeded that of the secondary industry. In 2016, the contribution rate of the tertiary industry was as high as 82.9%, which declined in 2017. On the whole, Shanxi's industrial structure as a whole presents a situation of low efficiency of the primary industry, a large proportion of the secondary industry, and a low share of the tertiary industry. The long-term unitary industrial structure has not yet been completely transformed. Secondly, from the perspective of the internal structure of the secondary industry, the characteristics of heavy industry are obvious. 2016 Nian, Shanxi Province, heavy industry reached 3642.4968 billion yuan, accounting for the province's industrial added value of 92.24%. Among them, the added value of coal mining and washing industry accounted for 48.32% of the province's industrial added value, and the coal-related coking industry ranked third. Finally, from the perspective of coal companies' vigorous development of non-coal industries, relevant data from the Shanxi Provincial Bureau of Statistics show that as of 2015 , there are about 200 coal companies investing in the development of tourist attractions and entertainment facilities, such as the Lius invested and developed by Jinmei Group Residential tourist attractions, the average daily number of

tourists received is more than 2,000 times, and the operating income of the tourism industry has increased significantly. In the case of the downturn of the coal industry, the tourism industry has brought new development momentum to Jinmei Group. In the process of transformation and development, the government actively encourages coal companies to develop non-coal industries, explore a diversified path to sustainable development, and get rid of resource dependence.

To sum up, in the process of transformation and development of Shanxi Province, the industrial relevance between the secondary industry dominated by the coal industry and the tertiary industry dominated by cultural tourism has increased, and the complementary and harmonious relationships between industries and the ability to transform each other Improvement is one of the signs that the industrial structure tends to be rationalized. In 2016 and 2017, Shanxi Province maintained the industrial structure of the higher-level development form of "three, two, one" unchanged, reflecting the initial effect of rational optimization and adjustment of the industrial structure of Shanxi Province. Obviously; the proportion of the three industries is constantly being coordinated, but the proportion of the secondary industry is still large. The "three, two, one" industrial structure has not yet shown a stable development and a more obvious advanced state, and the industrial structure has not yet reached the standard of rationalization. Although Shanxi Province has vigorously promoted the development of non-coal industry in recent years, the proportion of coal industry has declined, but it is difficult to reverse the coal industry-led situation in a short period of time, and it is difficult to transform to a diversified industrial structure. At the same time, Shanxi Province is still dominated by traditional tertiary industries such as transportation, warehousing and postal industry. The proportion of other service industries is showing a slow upward trend, but the proportion is still relatively small, especially scientific research and technical services, tourism. The proportion of modern producer service industries such as the environment and public facilities management industry is extremely low. The development momentum of emerging service industries is insufficient, and the support for the internal optimization of the tertiary industry is limited.

3.1.2 The level of industrial technology has improved but the industrial structure has not reached advanced level

Technological innovation is an important driving force for the transformation of the coal industry. Since the transformation of the coal industry, Shanxi Province has attached importance to scientific and technological research and development, vigorously developed new technologies in the coal industry, and widely used modern technologies in coal production, making certain progress in technological development. First, the completion of a number of modern mines has not only improved mine safety, but also increased the utilization rate of coal resources and the proportion of coal fine processing to a large extent. Second, new progress has been made in the clean utilization of coal, and major breakthroughs have been made in the technical research of coal-to-liquid and coal-to-methanol polyolefin projects. Third, build a technological innovation city to attract and encourage R&D institutions and high-tech enterprises to settle in. Statistics show that high-tech enterprises have 2010 years of 200 Ge increased to 2015 in 720 Ge, patent applications from 2010 in 2.6 Wan Jian increased to 2015 in 7.9 million. Third, the past two years, Shanxi to further promote the "mechanization substitutions, automatic cut people," the province's 25 coal mines 31 piloted upgrading automation and electro-hydraulic control fully mechanized mining face, there are 75 Zuo mine 15 3 Two underground substations and 62 pump houses have been automated and unattended, and the number of people entering a single shift in the original 11 "thousand-person mines" is controlled within 900. Fourth, at the China (Taiyuan) Coal Trade Fair held in 2019, the coal industry in Shanxi Province used Internet thinking to reorganize the industrial supply chain, creating a standard online-to-offline e-commerce platform, and launching the trading center coal chemical platform for Coal chemical industry chain enterprises provide one-stop, comprehensive, and specialized transaction services to realize the integration of transaction flow, information flow, capital flow, and material flow, and promote the innovation and development of the coal chemical trading market. In recent years, although the level of technological innovation in Shanxi's coal industry has continued to improve, there is still a long way to go before the goal of advanced

industrial structure.

First, from the perspective of science and technology investment, according to the "Statistical Bulletin of Shanxi Province Science and Technology Investment," Shanxi Province's R&D investment in 2014 was 15.22 billion yuan, a decrease of 1.8% from the previous year, ranking 20th in the country; Shanxi Province's R&D The funding intensity is 1.19%, ranking 16th in the country. It can be seen that, from a national comparison, Shanxi Province as a whole lags behind the national level, the government still invests relatively little in technology research and development funds, and enterprises still do not pay enough attention to technological innovation. The insufficient investment in technology research and development funds directly leads to innovation in the province. There is a shortage of talents for development and insufficient motivation for innovation.

Second, from the perspective of the signs of advanced industrial structure, advanced industrial structure means that the proportion of high-efficiency industrial sectors representing modern industrial technology standards is increasing, and the economic system has shown huge continuous innovation capabilities. First, Liu Wei (2008) and others proposed that the measurement of industrial structure height must essentially be a measurement of labor productivity. 2016 years, the contrast Shanxi, Shanxi, Inner Mongolia and labor productivity of the three ancient coal province, Shanxi per unit of production of about 990 Wandun / person, Shaanxi about 1392 Dun / person, Inner Mongolia reach 4463 Dun / person, Shanxi is 4.5 times. It can be seen that Shanxi's coal industry has low labor productivity and is in a disadvantageous competitive position among the three major coal provinces. Secondly, by exploring the changes in total factor productivity of the Shanxi coal industry, compare the Malmquist productivity coefficient, technological progress coefficient, technical efficiency coefficient, pure technical efficiency coefficient, and scale efficiency coefficient of the coal industry in Shanxi Province and the coal industry in China in recent years.[5] It can be found that the total factor productivity of the coal industry in Shanxi Province has increased by 5.7% on average, which is higher than the national average growth level. The main reason is the increase in coal technical efficiency, which has an average growth rate of 7.8%, while the level of technological progress has Decrease, and progress is slow; further decomposition, in the improvement of technical efficiency, basically scale efficiency is at work, pure technical efficiency has not been improved, and the country is affected by both pure technical efficiency and scale efficiency. Because coal companies do not pay much attention to informatization, lack a comprehensive understanding, business processes are not standardized, professional and technical personnel are insufficient, purchasing capacity is limited, the identification level of technical products is low, and the use environment is poor, resulting in a relatively high degree of informatization in the coal industry. Low, information is not blocked smoothly, and some important production, scientific research, management, and sales information cannot be used directly, which affects the improvement of pure technical efficiency. As a result, the decline of Shanxi's technical level and the low level of pure technical efficiency have jointly affected the deep transformation of the coal industry in Shanxi Province, indicating that within the economic system of Shanxi Province, the coal industry has not shown huge and sustained innovation capabilities. . Finally, the study of modern technology on behalf of the industry standard high-efficiency industrial sectors the proportion can be found, the proportion of tertiary industry in recent years, although Shanxi Province presents a rising trend from 2011 Nian 35.35% increase of the proportion of the 2018 year 53.44%, but the tertiary industry does not fully represent the modern industrial technology standards; the secondary industry dominated by the coal industry is also constantly modernizing the industry in the process of transformation and development, but it does not represent the modern industrial technology standards, and its proportion It dropped to 42.15% in 2018. Sum up the low labor efficiency coal industry in Shanxi Province, and the slow decline in the level of technological progress, pure technical efficiency and low proportion of modern technology on behalf of industry standard high-efficiency industrial sectors can not measure the absolute nature, come Shanxi Coal The industrial structure has not yet reached the advanced standard.

3.1.3 Excess capacity continues to be resolved but the situation of excess has not changed

As an important producer of coal in China, Shanxi Province has actively promoted supply-side structural reforms in recent years and has achieved remarkable results in reducing production capacity. In 2017, Shanxi Province closed 52 coal mines and withdrew production capacity of 49.5 million tons. In 2018, 36 coal mines were closed and withdrawn, and production capacity was 23.3 million tons. Meanwhile, Shanxi Coal Enterprise is committed to strengthening the capacity of high-quality supply, 2017 Nian end, the province's coal quality production capacity to 39614.4 million tons, accounting for the total production capacity of 42%, an increase of 6 percentage points. At the end of 2018, Shanxi's high-quality coal production capacity was 582 million tons, an increase of 186 million tons from the end of the previous year, accounting for 57% of the province's total coal production capacity, a year-on-year increase of 15 percentage points.

However, judging from the overall development status and requirements of the country in the new period, as my country's economic development enters a new normal, the economic growth rate slows down, and the demand for coal resources will gradually decrease. The power and metallurgical industries have always been the industries with the greatest demand for coal resources. However, as far as the country is concerned, the demand for coal resources in the steel industry is close to saturation, which also means that the demand for coal resources will continue to decline. Shanxi's coal production capacity is higher than the national average but the capacity utilization rate is less than 80% lower than the national average [6] . It can be seen that the situation of coal overcapacity has not changed in the short term. The coal industry can only respond to the new normal of the coal industry by eliminating outdated production capacity, improving coal quality, and expanding coal product varieties.

3.1.4 Industry resource integration to achieve substantive results yet but elements of configuration is not optimized

Since Shanxi Province formally implemented mergers and reorganizations in 2005 , it has combined the coal industry's "multiple, small, scattered, and chaotic" industrial pattern, clarified the main coal resources integration, and promoted the rational mergers and reorganizations of large coal mining groups with small coal mining groups, and banned and closed them. There are a large number of small coal mines with outdated production capacity and poor safety guarantees. The number of mines has been adjusted from more than 4000 in 2005 to 1053 at the end of 2010, and the mine production scale is not less than 900,000 tons per year, which has largely curbed small coal mines. Coal mines are flooded and coal resources are wasted. In addition, coal mining enterprises have all implemented mechanized mining after mergers and reorganizations, which not only improves the efficiency of coal resource extraction, but also improves the safety level of coal workers.

However, in terms of the overall transformation and development level of the industry, the allocation of capital, labor, energy, land and other factors in the coal industry in Shanxi Province has not yet been optimized. First, the consolidation and merger and reorganization of coal enterprises in coal resources, making Shan Xi Province, the coal market has been optimized and standardized, but after the annexation of large coal enterprises still exist energy waste problem and the low utilization rate of labor productivity is low. Second, the downturn of the coal market restricts its investment attractiveness, while coal prices are operating at a low level. Capital inside and outside the industry cannot form an effective capital recycling circle, and capital investment and utilization efficiency are both at The low level makes it difficult for capital, the key force for optimizing resource allocation, to maximize its power. Third, the long-term heavy-industrial structure of Shanxi Province has caused a large amount of labor force to flow into the secondary industry. This has led to the current internal staff and institutions in the coal industry, and the quality of the labor force is low. The division of labor is not obvious. Coal companies grasp labor The elements are not precise and the improvement of labor skills is limited. Fourth, Shanxi is an underdeveloped inland region. Due to the echo effect, labor and capital elements flow to developed areas, and policies to support science and technology and attract talents and capital have not been

perfected. Labor and capital elements have not played a sufficient role in industrial transformation and development.

3.2 Affect the development of the coal industry restructuring due to factors

3.2.1 Technological innovation

Science and technology are the primary productive forces, and the key to industrial transformation is technological progress and innovation. Technological progress and innovation can bring economic benefits of sustained growth, which is a dynamic economic benefit. Generally speaking, there are two ways for technology to create benefits, one is the introduction of external technology, and the other is the internal innovation of independent technology. On the basis of introducing advanced technology, digesting and absorbing, and researching, improving and innovating, accelerating the transformation and application of technological innovation results, and establishing its own industrial technology system plays an inestimable role for the coal industry.

In the current situation of energy reform and industrial upgrading, Shanxi Province still faces many problems in the technological innovation of the coal industry. First, from the development of innovative economy in Shanxi Province invested indicators (Figure of 3- 2), 2008-2017 between years, Shanxi Province, R & D funding was overall strength of the rise, but the increase is not significant. After 2009 , it has basically remained at about 1% , which is still far from the national average (the national funding input intensity in 2017 was 2.13%), indicating that Shanxi Province still needs to increase its investment in science and technology, and investment in science and technology manpower and finance are still inadequate, which hampered to some extent, the focus of the transformation industry in Shanxi Province - depth restructuring of the coal industry, solid progress, hindering the development and application of human capital accumulation and new coal technologies, coal and local professional lack of talent charcoal, resulting in many Technical personnel are introduced from other places. However, due to the inability to provide a good talent cultivation environment, policies and financial support, there is a large loss of talents in the professional field of coal industry in Shanxi Province, lack of vitality and motivation for technological innovation, and the industry's scientific and technological strength is also very strong.

Second, the low technical level of coal mining and production and processing has led to prominent safety issues in the coal industry in recent years. With the expansion of mining depth, Fu gas inventory increase, many coal mines has become a high-gas coal mine, the threat of natural disasters more prominent, the higher the risk of uncertainty, some coal mines by the restrictions on natural conditions and their own developments Even unable to participate in the industrial transformation, the coal industry transformation lacks the most basic security factors. Third, the current coal mechanization, high-efficiency mining technology and high-tech equipment are still not widely used and popularized, resulting in serious waste of a large amount of coal resources and low comprehensive utilization rate of coal. During its limited period of play, it cannot be used. The advantages of natural resources are transformed into economic advantages to the maximum extent. The imperfect technical level restricts the intensive growth of mining areas and cannot provide a strong and sustainable guarantee for the transformation of the coal industry. Fourth, the coal industry is not large-scale, large-scale adoption of cleaner mining technology and clean coal technology, making the environment more and more overwhelmed, unable to industrial transformation and ecological environmental development, ecological environment can not be transferred to industry type provide good The guarantee of sustainable development has further hindered the industrial transformation. Fifth, small and medium-sized coal enterprises are scattered in Shanxi Province. Some coal enterprises are eager for quick success and quick profit. They do not care about investment, but care about mass production; they do not care about quality but only about output. At the same time, the closed production and life for a long time have caused Shanxi people to form a backward and conservative thinking that is not willing to change. The atmosphere of technological innovation is poor and the foundation is weak. It is difficult to promote advanced technology and advanced equipment in people's minds and in business operations. , The level of operation and management and the importance of talents are relatively low, and it is difficult to

contribute to the transformation of the coal industry.

3.2.2 Allocation of production factors

In industrial transformation and upgrading, the essence of industrial structure adjustment is to optimize the allocation of production factors between industries in order to maximize the economic and technological advantages of production factors.

The coal resources of Shanxi Province are where its resource advantages lie. In order to make good use of its resource advantages, it is necessary to make a fuss about the resource allocation itself, and also to adjust the investment structure. Through the reasonable allocation of incremental assets, it will drive the adjustment of stock assets. The realistic approach and inevitable choice of industrial structure adjustment. At present, the irrational allocation of production factors of the coal industry in Shanxi Province has the following three aspects to the transformation of the coal industry. First, the distribution of coal resources is relatively scattered, the waste of small coal mines is more serious, and production safety is lacking, which affects the coal industry's market concentration, entry barriers and high standards, high starting points, and high efficiency standards for the construction of coal transformation enterprises. Second, the industrial chain of the coal industry is relatively short and the synergistic development effect with the coking, metallurgy, and steel industries is not significant. The products of the coal industry are relatively single, with insufficient processing depth, and low utilization of resources and low added value. Third, inadequate attention is paid to industrial integration, departmental integration, and technological integration within the industry, resulting in low efficiency of industrial clusters and low level of technology promotion. Entrepreneurs can exert poor benefits and small scope, which is not enough to drive the improvement of medium-sized coal enterprises' management level. The low level and low efficiency of transforming resource advantages into economic advantages affects the coal industry's better utilization of resources and the effect of knowledge diffusion in the process of transformation. Fourth, Shanxi Province is a major coal province as well as a major cultural province, with outstanding advantages in cultural tourism resources. While promoting the transformation and upgrading of the coal industry, coal resources and cultural resources are not closely connected and integrated. It is difficult to develop a unique coal culture, and the transformation of the coal industry cannot develop in the direction of deepening and industrial integration.

3.2.3 Market demand

Under the conditions of a market economy, market mechanisms play a decisive role in resource allocation. Only by efficiently and accurately capturing market demand and assessing the situation can we win the market.

(1) Domestic market

Under the background of accelerating the supply-side structural reform in the new era, the reason for the deepening of the supply-side structural reform of the coal industry in Shanxi Province is the imbalance of the market supply and demand structure. In recent years, with the people's growing needs for a better life, the demand structure has accelerated, consumption capacity has continued to grow, and high-quality supply has become increasingly urgent, but the supply structure has not changed accordingly. Facing the new and diverse market demands in the new era, it is more important to improve the adaptability and flexibility of the supply side to market demands. Market demand is becoming more advanced and individualized. Coal companies can only set high standards centered on market demand, and rely on technological innovation and development, especially independent innovation and research and development, to optimize supply and solve the current problems of overcapacity and low supply. As a basic industry of the national economy, coal demand is mainly concentrated in the power, steel, chemical and other industries, which has a profound impact on economic development and social stability. With the slowdown of economic growth, the demand for coal resources in various industries has become saturated, and the demand has fallen sharply, which has led to a sharp drop in coal prices. The operating conditions of high cost and low income have caused a general decline in corporate efficiency, and a large number of

coal companies have closed down. This phenomenon has adversely affected the employment of economic development workers and social stability. The diversification, advancement and individualization of domestic market demand has forced the transformation of the coal industry to focus on demand, put product quality in the first place, strive to open up new market areas, and actively develop new subsidiary products in order to meet The growing needs for a better life and new production needs have won the domestic market.

(2) International market

Due to the low coal conversion rate and low utilization efficiency in China, a considerable part of coal still needs to be imported. According to statistics, China's coal and lignite imports in 2019 were 297.67 million tons, an increase of 6.6% compared to 2018, and the import amount was 23.395 billion U.S. dollars., A year-on-year decrease of 4.9% . The imported coal market presents two major characteristics: First, the total import volume and monthly import volume have exceeded market expectations. Second, the Australian coal price has a more obvious advantage over domestic coal prices than in previous years. Compared with the import market, my country's coal exports are much lower than imports. The combined effect of the decline in the international market's demand for China's coal and the increase in China's demand for international coal has made Shanxi's coal industry , which accounts for 26% of the country's coal production, a need to eliminate outdated production capacity and resolve excess production. The most important thing is to increase the supply of high-quality production capacity. , In the transformation of continuously improving technology and reducing production costs, strive to reduce coal prices, so as to meet the domestic demand for high-quality and inexpensive coal products, and to gain higher market competitiveness with better quality to expand exports.

4. Analysis of the impact mechanism of the transformation and development of the coal industry in Shanxi Province

4.1 Coal industry structure transformation mechanism

Shanxi's long-term "one coal dominates" situation has led to an imbalance in the proportions of the three industries, and more capital, manpower, land, and technology have flowed into Shanxi's pillar industry and leading industry -the coal industry. Through the upgrading and transformation of market demand in recent years, and the increase in the contribution rate of technological progress, the coal industry structure has been continuously promoted to rationalize and advanced.

On the one hand, due to the urgent need for the transformation of industrial structure, the saturation of the coal market and the increasing demand for the tertiary industry, some production factors have gradually flowed into the tertiary industry, and the rational distribution and coordination of factors among industries has been promoted. development of.

On the other hand, with the continuous improvement of the level of technological innovation, the coal industry's comprehensive development and utilization of coal resources has increased. The coal industry can make full use of existing factor inputs and even reduce factor requirements, and carry out a comparison between the coal industry and the non-coal industry. The cooperation and coordinated development between the three industries will further promote the flexible and reasonable flow of factors among the three industries, adapt to market demand, adjust the single and heavy industrial structure, and gradually move towards a diversified, rationalized and advanced industrial structure.

4.2 Coal industry to create new mechanisms for restructuring

At present, China's economic development has entered a new era, and the transformation and development of the coal industry in Shanxi Province has also ushered in a new stage of innovation and transformation. The continuous upgrading of the demand structure requires the transformation of the coal industry to be more aligned with market demand and to conduct product development and supply through positive market feedback.

On the one hand, the progress of market demand has promoted the progress of technological

innovation in the coal industry. In order to meet the new and advanced market demand, the coal industry must optimize the allocation of limited production factors and further improve the level of technological innovation. Through technological innovation, Industrial innovation is used to widen and lengthen the traditional industrial chain, broaden its production and processing paths and scope, continue to extend to the terminal consumer product market, broaden sales channels, and serve the tertiary industry and end consumers.

On the other hand, coal resources as a non-renewable energy sources, to seek coal enterprises in the mining and production processes to be reasonable and effective resource allocation and use of resources, improve the comprehensive utilization of resources, human capital, resource elements, technical elements, industrial The four production factors of capital are organically combined and rationally allocated to optimize and refine the coal industry chain, so as to promote the further development of technological innovation in the coal industry, better enable high-tech equipment and professional and technical personnel in the industry to give full play to their advantages, and promote the overall coal industry Improve the level of science and technology to create a new, informatized, and technological coal industry.

4.3 Green transformation mechanism of the coal industry

In recent years, the urgent need to build a resource-saving and environment-friendly society has made it necessary for the development of the coal industry to change the production methods of high pollution and high energy consumption and take the path of sustainable green transformation.

On the one hand, with the new round of technological revolution and industrial transformation, green, low-carbon, and high-efficiency market demand has put forward higher development requirements for the transformation of the coal industry in Shanxi Province, and therefore promoted clean mining technology, The R&D and application of clean coal technology, waste recycling technology and deep processing technology have further promoted the upgrading and transformation of the coal industry chain, bid farewell to the high energy consumption and high pollution industrial chain in the past, and made coal production more sustainable and reduced negative externalities. Promote the transformation of the coal industry to a green and clean direction.

On the other hand, the efficient and clean utilization of coal resources and the development and application of clean coal technologies have gradually led to the gradual greening and cleaning of the allocation of factors in the industry, and jointly promoted the transformation of the coal industry in a sustainable and modern direction.

5. Policy suggestions for the transformation and development of the coal industry in Shanxi Province

5.1 Strengthen technological innovation and boost the core competitiveness of the coal industry

Innovation is the first driving force to lead development, the soul of an enterprise, and the guarantee of its sustainable development. The reality of economic development tells us that only by relying on technological innovation can the coal industry get rid of the predicament of development. Facing the status quo of the transformation and development of the coal industry in Shanxi Province, technological innovation is an important way to realize the strategic transformation and leapfrog development of the coal industry in Shanxi Province.

First, we must strengthen the technological innovation of coal production. Including the innovation of production equipment, mining technology, and processing technology. The realization of technological innovation can be achieved through two aspects: external innovation and internal innovation. Exogenous innovation requires opening up the coal industry to strengthen, encourage coal enterprises to enter the international market, foreign companies involved in mergers and acquisitions, access to developed countries, the emerging coal-known knowledge technology, in order to strengthen the basis of the coal industry in Shanxi innovation technology to improve

awareness of technological innovation of enterprises. Endogenous innovation requires coal companies to actively carry out technological innovation and focus on the construction of industrial independent innovation capabilities. With strong financial strength and strong technological innovation capabilities, coal companies can vigorously develop key technologies and core technologies through independent research and development of coal chemical products and technologies, and make breakthroughs on the road of independent innovation, in order to bring huge investment returns and sustained competitive advantage. Currently, coal charcoal industry entered a crucial stage of transformation of the new period of development, technological innovation is an important innovation in the coal industry, is the most important task of industrial transformation and upgrading, for enhancing the core competitiveness of the coal industry in Shanxi Province has important significance. As the main body of technological innovation, coal enterprises should grasp the main direction of technological progress and innovation, concentrate on breaking through key technologies in key areas, and create modern coal enterprises with technological advantages.

Second, we must strengthen the management level innovation of the coal industry. The innovation of the internal management system and mechanism of the enterprise, the training of management personnel within the coal enterprise, and the management of the mining and utilization of coal resources are all areas of management innovation. At present, Shanxi Province has achieved preliminary results in the integration of coal resources and the merger and reorganization of enterprises. The effect of industrial clusters is significant, and the significance of the management innovation of coal enterprises corresponding to it has become increasingly prominent. Improve the technological level of management, establish a modern enterprise management concepts, protection of healthy enterprises, efficient operation, can provide innovation and progress good environment for enterprise development and environment; improve the technological level of management, to promote the strategic management of innovation to help businesses quasi accurately grasp Market demand, technological development and innovative market supply, enable enterprises to maintain a long life and enhance their core competitiveness. At the same time, the management level innovation of the coal industry is inseparable from human capital. On the one hand, it is necessary to increase the attractiveness of enterprises, introduce high-tech talents for enterprise management training and management work, help enterprises to carry out basic management construction, and creatively propose the requirements of the current coal industry development requirements and the current development situation of the coal industry. Management system and mechanism design; on the other hand, it is necessary to strengthen the job training of the original labor force in the enterprise, strengthen technical expertise, create a strong atmosphere for enterprise technological innovation and a good environment for employee development, and strengthen talents through property rights incentives, status incentives and cultural incentives Recognition, sense of belonging, and empathy for the company, so as to ensure that the supply of professional talents is not lost through the sharing of property rights, status enhancement, and cultural constraints , which in turn stimulates employees' independent innovation behavior and efforts to participate in innovative actions, and transforms the coal industry Contribute to the upgrade.

Third, it is necessary to strengthen the innovation of the concept of transformation and development. Shanxi Province is in an inland enclosed area. The long-term low-level, high-energy consumption, and large-scale coal mining has restricted the cultivation of Shanxi people's thinking and innovative ideas for development. During the transformation and development of the coal industry, it is necessary to cultivate an advanced corporate culture and coal culture, introduce the concept of green development and circular economy into the practice of the transformation and development of the coal industry in Shanxi Province, and innovate the overall strategic goals.

5.2 Optimize the allocation of production factors to achieve the minimum input and maximum output

In the process of industrial transformation and upgrading, the coal industry needs to adjust and optimize its industrial structure in a timely manner. Through the optimized combination of production factors, reasonable substitution and reasonable selection of intensive methods, a

reasonable and optimized allocation of production factors is achieved, which is conducive to the coal industry to maximize its resource advantages. Transform land into economic advantages, enhance industrial competitiveness, and promote the sustained, stable and coordinated development of the national economy. The distribution of coal resources in Shanxi Province is relatively scattered, and the development levels of large, medium and small mines are different, and mining technologies and processing techniques have their own standards and characteristics. In order to achieve the minimum input and maximum output, it is necessary to proceed from the perspective of resource optimization and effective utilization, and implement large, medium and small mines in accordance with the geographical conditions of mineral reserves, etc., to develop the coal industry in a focused and step-by-step manner. On the one hand we should pay attention to the development of small coal mines, coal resource development adjustment, production, processing share capital increase based on the actual situation source of comprehensive utilization, reduce waste of resources. On the other hand, it is necessary to increase the market concentration of the coal industry, set high standards and advanced barriers to entry, encourage rational mergers and reorganizations within the coal industry, and drive the influence of small and medium-sized mines through strong alliances between large mines and radiation, Comprehensively improve the level of coal resource development and utilization, and standardize the coal mining market. Optimizing the allocation of coal resources means through the integration of coal resources. The limited coal resources should be rationally planned. Priority should be given to the allocation of resource reserves and large-scale areas to large-scale, intensive, and mechanized large mines for coal mining , Production and processing, in order to achieve the purpose of improving resource allocation efficiency and comprehensive utilization efficiency. Government needs to re-survey of the basic resources, good planning the integration of coal resources, to provide full, a small mine information surface, providing excellent channel for large mines, through the combined effect of the industry within the enterprise and between upstream and downstream industries and The combination of power and power will realize economies of scale and scope, maximize output with minimal input, and improve the transformation and development level and benefits of the entire coal industry.

5.3 Aligning with market demand, optimizing product supply, optimizing and extending the industrial chain

There are new market demands in the new period, and there must be new market supplies in the new period. The coal industry in Shanxi Province must deepen the supply-side structural reform, have a keen eye and sense of market changes, and be able to assess the situation and respect the law of coal supply, and must not blindly estimate the market and excessively expand production capacity. The demand structure of the new era is more new and advanced, and the supply of the coal industry needs to be diversified and innovative. On the one hand, coal enterprises should broaden and lengthen the traditional industrial chain through technological innovation and industrial innovation, deepen processing of coal resources, improve the comprehensive utilization of coal resources, broaden their production and processing paths and scope, and increase the added value of coal resources. And continue to extend to the terminal consumer goods market; on the other hand, coal companies should pay close attention to high-end technology, actively introduce modern technology, improve industrial quality and technical level, promote the diversification and high-end of coal products, and refine the industry chain.

Restructuring and development of the coal industry to be aligned with market demand, bid farewell to the "resource curse", so gifted extend the industrial chain, promoting industrial relationships based on upstream and downstream industries, achieve vertical integration, the promotion of new models on the joint development of downstream industries, greatly Improve the added value of the industry and the comprehensive economic benefits of the coal industry. The coal industry in Shanxi Province can promote the comprehensive development of coal resources and supporting resources in accordance with the development requirements of coal - electricity - construction, coal-electricity-aluminum, coal-iron-steel, coal - coking - chemical and other industrial chain groups to form diversification. The industrial

chain system promotes the degree of synergy and integration between the coal industry and its upstream and downstream industries.

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