

# Developing Strategic Emerging and High-Growth Green Industries in the Qinba Mountain Area

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**Abstract:** This study summarizes the current situation and characteristics of the economic and social development of the Qinba Mountain Area, and proposes that it is necessary to establish an overall strategic goal for the development of modern industries in the rich ecological conditions of this region. It also investigates a coordinated and sustainable development mode for ecology and industry, and indicates the urgency, necessity, and feasibility of developing strategic emerging and high-growth green industries in this region. Furthermore, a spatial pattern of “one circle, multiple axes, one network, and two regions,” as well as a dynamic mode of “two-way gradient development and coordination of ecology and industry” are studied. An evaluation system of industrial development, comprising evaluation indicators, industrial-type screening, and technology assessment, is proposed. Industrial distribution principles, the industrial layout of regional collaboration clusters in the Qinba Mountain area, and the industrial correlation effects are expounded. Moreover, some suggestions are proposed, including developing a green economy, establishing a cross-regional cooperation mechanism, providing talents for the development, increasing the input of green capitals, actively combining the green industry with rural revitalization, cultivating social enterprises and institutional entrepreneurs, and exerting the role of the market mechanism to promote the integrated development of the green industry.

**Keywords:** Qinba Mountain Area; strategic emerging industry; high-growth green industry; rich ecological conditions; green industry development system; coordinated development between ecology and industry

## 1 Current situation and characteristics of the Qinba Mountain Area

### 1.1 Vast area, large population, and prominent geographical advantages

The Qinba Mountain Area covers five provinces and one municipality: Shaanxi, Henan, Hubei, Chongqing, Sichuan, and Gansu. This region includes 20 cities with divided districts, Gannan Tibetan Autonomous Prefecture in Gansu Province, Shennongjia Forest Region in Hubei Province, and 119 counties (districts or county-level cities), with a total area of 30.86 million km<sup>2</sup> and a total population of 61.64 million people [1]. The Qinba Mountain Area is located in the hinterland of China’s geographical center, which is the watershed of the Yangtze River, the Yellow River, and the Huaihe River; it is also an important geographical boundary between the north and south of China. It is an important land bridge channel for regional transportation and intersects the Belt and Road, an extremely important geographic location [2].

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### **1.2 Rich regional ecology but with a serious degradation problem**

The Qinba Mountain Area was listed as a National Key Ecological Functional Region, which restricts large-scale, high-intensity industrialization and urbanization development, according to the *National Main Functional Area Plan* ((2010) No. 46). Soil erosion and geological disasters are prominent in this region; biodiversity is also threatened. This region is positioned as an important area to ensure national ecological security and to demonstrate the harmonious coexistence between humans and nature. *National Ecological Function Regionalization (Revised)* also included the Qinba Mountain Area as an extremely important area for biodiversity conservation, a highly sensitive ecological area with soil erosion (an extremely important area for national soil conservation), and a very important ecological function area for water conservation.

### **1.3 Weak regional economic foundation, lagging in social development**

The Qinba Mountain Area was identified as one of the 11 concentrated contiguous regions with special economic difficulties in the *Outline of Poverty Reduction and Development in Rural China (2011–2020)* ((2011) No. 10). This area includes the largest number of provinces with large development differences and weak industrial support capacity. In addition to the lagging infrastructure construction, prominent traffic constraints, and insufficient basic public services, other multi-dimensional development constraints, such as lack of scientific and technological support, also exist.

### **1.4 Enhanced radiation-driven ability of urban agglomerations, with a gradual emerging regional development potential**

The *Opinions of the Central Committee of the Communist Party of China and the State Council on the Establishment of a New Effective Mechanism for Regional Coordinated Development* (Nov. 18th, 2018) indicate that the development of the urban agglomerations of Chengdu–Chongqing, middle Yangtze River, Central Plains, the Guanzhong Plain, and Lanzhou–Xining will promote national strategic integration and development in major regions. A new model should be established in which central cities lead the development of urban agglomerations and these agglomerations drive regional development to promote the integrated and interactive development of regional sectors. The above-mentioned five urban agglomerations, including seven central cities at or above the provincial capital level, are distributed across the Qinba Mountain Area. Giving full play to the accumulation, radiating, stimulating, and enhancing functions and special advantages of the aforementioned urban agglomerations in areas such as social, economic, technological, cultural, educational, industrial, and marketing will provide traction and radiating effects for the economic and social development of the Qinba Mountain Area.

To achieve rural revitalization and long-term high-quality sustainable regional development, it is urgent that the Qinba Mountain Area establishes an overall strategic goal for the development of modern industries under rich ecological conditions. Not only should we promote the development of high-growth green industries and realize the rapid development of leaps and bounds, but we must also vigorously cultivate and develop the strategic emerging industries to achieve sustainable development. The rapid economic and social development of the Qinba Mountain Area has the strategic significance of serving as a realization of the idea for national ecological green transformation, promoting new urbanization strategies, establishing demonstrations of green development in mountainous areas, assisting the construction of the Silk Road Economic Belt, and further developing the western region.

## **2 Analysis of the development of the strategic emerging and high-growth green industries in the Qinba Mountain Area**

### **2.1 Coordinated and sustainable development mode between ecology and industry**

Experiences of positive and negative aspects of industrial development are fully summarized. On the one hand, foreign countries unilaterally emphasize the development of the tertiary industry and promote a “de-industrialization” virtual economy characterized by “asset-dependent” and “service-dependent” service economy, lacking the support of the real economy. This has led to the hollowing of the manufacturing industry, the imbalance in industrial structure, the subprime mortgage crisis, and the evolution of the international financial storm. On the other hand, the extensive traditional industrial development model exhibits an irrational economic structure, increasing the pressure on resources and the environment. This results in the bilateral issue of excess

production capacity and unsustainable development. Thus, an appropriate adjustment of the original mode of industrial development must be accelerated. Therefore, it is undesirable to develop the tertiary industries dominated by the service economy or continue to implement the traditional industrial model in the Qinba Mountain Area.

Green industries aim to prevent environmental pollution and protect the ecological environment, and refers to economic activities such as technological research and development, engineering construction, and resource utilization which are conducted with green technology and green investment as a guarantee. In a broader sense, green industries advocate the ideas of resource conservation and environmental friendliness during industrial production processes, and implement low-pollution and low-emissions concepts, exhibiting high ecological, economic, and social values [3]. Ecology needs to be industrialized to turn ecological resources into economic assets. Taking ecology as an industry for proper development, the industrial value of ecology itself could be fully considered and realized. Green water and mountains should be kept when acquiring economic development; therefore, the industries must be ecological. Green, circular, low-carbon ecological industries with high correlation and a strong driving force should be developed to incorporate industrial processes into the ecosystem. Eco-industrial development is an important way to change the economic development mode from extensive to intensive, and achieve sustainable economic, social, and ecological development.

The Qinba Mountain Area should develop a green economy with good ecology and circular, low-carbon industries. Green, organic, and ecological agriculture should be vigorously developed in the primary industry; strategic emerging industries should be developed in the secondary industry; and, high-growth modern service industries such as commercial and logistics, e-commerce, eco-tourism and financial insurance, and information exhibitions should be intensively developed in the tertiary industry. To realize the sustainable development of the regional economy and society, a modern service industry must form a spatial pattern, industrial structure, and production mode that protect the environment and conserve resources.

## 2.2 Analysis of the development of regional strategic emerging industries

One of the theories of industrial economics was that of the British classical economist Adam Smith, who proposed the theory of comparative advantage in the 18th century. The Japanese economic community developed it into a “dynamic comparative advantage theory,” arguing that the government must support and help the industries with development potential and transform the currently disadvantaged industries into comparative ones, which would then drive a rapid economic and social development. The American economist Albert Otto Hirschman mentioned the theory of unbalanced growth of economic development for “strategic industries” in *The Strategy of Economic Development* in 1958. He believed that in the development of industrial planning, industries with higher forward and backward correlation should be developed first, which is conducive to influencing and driving the development of other industries, and thus promotes the development of the whole economy and society. In 1960, the American economist Walt Whitman Rostow proposed the economic development stage theory in *The Stage of Economic Growth* and in his *Politics and the Stages of Growth* in 1971, he specified six stages of development: traditional society, ready to take off, take off, toward maturity, mass consumption, and beyond mass consumption.

Strategic emerging industries are emerging industries based on major technological breakthroughs and development requirements, with intensive knowledge and technologies, low consumption of material resources, large growth potential, good comprehensive benefits, and a major leading role in the overall and long-term economic and social development [4]. The nine categories (fields) at the first level of the *Strategic Emerging Industries Classification (2018)* are new-generation information technology, high-end equipment manufacturing, new materials, biology, new energy vehicles, new energy, energy conservation and environmental protection, digital creativity, and related services industries [5]. The six characteristics of strategic emerging industries—leading, high-growth, low-carbon, pillar, global, and social features—create urgency, necessity, and feasibility for the cultivation, development, and expansion of strategic emerging and high-growth green industries in the Qinba Mountain Area.

### 2.2.1 Urgency

The leading characteristic of strategic emerging industries has laid an economic foundation for the development of the Qinba Mountain Area to narrow the economic gap between this area and other regions. Emerging technologies are the driving force for the cultivation and development of strategic emerging industries, which

guide economic development by giving birth to new industries and new modes. The transformation and upgrading of industries outside the Qinba Mountain Area to emerging industries will generate a massive shock wave threatening the survival of traditional industries. The deepening and expanding gap between economic and social development caused by successive shocks, which already exists inside and outside the Qinba Mountain Area, needs to be confronted. Only by carefully analyzing and studying the regional conditions of Qinba Mountain Area, selecting suitable strategic emerging and high-growth green industries, and cultivating, developing, and forming new formats will it be possible to achieve synchronized economic and social development within and outside the region and solve the problems of practical rapid and sustainable development in the future.

The high-growth characteristic of strategic emerging industries provides an industrial basis for accelerating economic development in the Qinba Mountain Area. Strategic emerging industries are new industries and formats with high integration of new technologies and new economies. They are in a dynamic development stage at which the industry begins to form and mature, starting to show strong demand after the cultivation and integration of technology and markets. Although such industries are in different stages of development, they are generally among the industries that have large market demand, rapid growth, long development sustainability, and rising productivity. They are the industries with the highest growth, enabling the Qinba Mountain Area to rapidly form a new economic growth point and accelerating the narrowing of the economic development gap within and outside the Qinba Mountain Area. Therefore, the urgency for the development of strategic emerging industries and high-growth green industries in the Qinba Mountain Area is immediate.

### 2.2.2 Necessity

The low-carbon characteristic of strategic emerging industries provides an ecological guarantee that the Qinba Mountain Area will adhere to the priority of ecological preservation and establish a modern industrial system. The development of a circular and low-carbon economy is an important measure to transform the current economic growth model. China is abandoning the development model of treating pollution after it has occurred and focusing on intensive production after extensive production; it is now paying more attention to the quality of economic development. The strategic emerging and high-growth green industries are low carbon and adhere to the development model of low carbon and environmental protection. Through strengthening industrial technological innovation, these industries continuously reduce carbon dioxide and sulfur dioxide emissions and reduce resource and energy consumption, playing an important role in transforming the economic growth mode and adjusting the economic structure.

The pillar characteristic of strategic emerging industries lays the foundation for the sustainable economic and social development in the Qinba Mountain Area. The cultivation and development of strategic emerging industries will gradually exhibit the basic characteristics of high technical content, large market demand, strong industrial linkage, strong sustainability, and low consumption of resources and energy. The strategic emerging industries will become the pillar industries of the national economy, continuously improving their contributions and constantly creating new jobs. The larger number of employment channels will transfer a large number of surplus labor from the primary industry to the Qinba Mountain Area, laying a foundation for giving full play to the demographic advantage dividend.

### 2.2.3 Feasibility

Strategic emerging industries exhibit the characteristic of globalization, which implies the feasibility of their development in the Qinba Mountain Area. In strategic emerging industries, the development of scientific and technological innovation, productivity, and emerging technologies derived from the latest research and innovation achievements in China accelerates the optimal allocation of various resource elements in different regions and promotes the flow of production factors in the market. Emerging industrial development is no longer restricted by time and space. The characteristic of globalization moderately reduces or eliminates the geographical constraints in the development of certain traditional industries. This allows the region to participate in the competition at the same starting line as that of other regions, thus generating major changes in the economic landscape and the possibility of reshaping the economic order.

The social characteristic of strategic emerging industries allows talent gathering and industrial agglomeration for the development of such industries in the Qinba Mountain Area. The development of strategic emerging industries, as well as the integration of new formats, can create more jobs with a good working environment, low labor intensity, and high remuneration, which will absorb the flow of various talents and at the same time change people's traditional ideas and ways of life and work. The unique ecological condition of the Qinba Mountain Area,

combined with a more comfortable and cleaner innovative living environment and high-quality jobs will attract talents to the region and new forms of business will gather, develop, and mature, forming a changing trend of population flow and promoting a new pattern of capital and materials flow in the Qinba Mountain Area. Thus, both the current and new residents of the Qinba Mountain Area will be able to live and conduct business effortlessly and with contentment, as the area will become better at meeting people's increasing material and cultural needs and promoting the harmonious development of society and nature.

To summarize, the Qinba Mountain Area exhibits the urgency, necessity, and feasibility of developing strategic emerging and high-growth green industries. It is possible to abandon the dependence on the traditional industry development path and directly choose strategic emerging and high-growth green industries to achieve sustainable development and structural optimization. Given the rich ecological condition of the Qinba Mountain Area, realizing the overall strategic goal of establishing a modern industrial development system and developing strategic emerging and high-growth green industries is an effective way to address the contradiction between the rich ecological environment and the backward economic and social foundations.

### **3 Spatial function and dynamic analysis of developing strategic emerging and high-growth green industries**

#### **3.1 Regional spatial pattern of “one circle, multiple axes, one network, and two regions”**

The Qinba Mountain Area belongs to the Key Ecological Function Region restricted by the state. The regional ecological protection and economic and social development are both extremely complicated tasks, indicating the high applicability of the theory of unbalanced growth of economic development.

Around the Qinba Mountain Area, seven large cities, including Chongqing, Chengdu, Wuhan, Zhengzhou, Xi'an, Lanzhou, and Xining, are the core, high gradient “points”, and main growth poles, which form the “megapolis circle around the Qinba Mountain Area” (one circle enclosing the outer edges of these cities). Twenty-two prefecture-level administrative units (20 districted cities, 1 autonomous prefecture, and 1 forest region) located in and outside the Qinba Mountain Area are the centers, the middle gradient “points,” and the sub-growth poles, which form the “central city multiple axes in the Qinba Mountain Area” (multiple axes). One hundred and nineteen counties (districts and county-level cities) include scattered county towns in the Qinba Mountain Area, and form a green, circularly developed “network” made of “pearl” towns (a network of enclosed local areas). The regional spatial pattern in the Qinba Mountain Area is divided into “one circle, multiple axes, one network, and two regions,” where the two regions are the ecological agriculture region (transition region) and ecological protection region (core region). Based on this division, five regions for the strategic development of green industries with different characteristics are set up, following the order “circle”–“axes” –“network” –“transition region” –“core region”. Ecological protection gradually increases from the “circle” on the outer edge to the “core region” of ecological protection, while in the opposite direction, industrial development gradually increases.

#### **3.2 The dynamic mode of “two-way gradient development and coordination of ecology and industry”**

According to the theory of unbalanced growth of economic development, the “core–edge theory,” and the expansion effect, agglomeration cores, formed by the five urban agglomerations of Chengdu–Chongqing, the middle reach of the Yangtze River, the Central Plains, the Guanzhong Plain, and Lanzhou–Xining, could develop and radiate to the inner central region of Qinba Mountain Area. According to the “point–axes theory” and by a strengthening of the combinations of “points,” which promotes the formation and development of the reticular “axes,” a new development model of “points” and “network” is established: 7 large cities lead the development of the 5 urban agglomerations, then drive the development of 22 central cities in the Qinba Mountain Area. This promotes the integration and interactive development of the regional sectors and propels the rational division of labor, industrial complementarity, up-down linkage, and integrated development of major national strategic regions. According to the “gradient shift theory,” the industrial nature, development direction, and functions of the core cities of the urban agglomerations, districted cities (autonomous prefectures and forest districts), and towns (counties, county-level cities, districts, and characteristic villages and towns) should be clarified. The industrial structure of the “points” and “axes” should be optimized and the types of industries to be concentrated in the “circle” and “network”, and the special industries to be expanded and strengthened in the “network” and “axis” should be determined, so as to avoid industries' backflow and “hollowed out” effects in the Qinba Mountain Area. An innovative development model for “two-way gradient development and coordination of ecology and industry”

should be formed to promote the coordinated development of ecology and industry.

## 4 Evaluation of the development system of strategic emerging and high-growth green industries in the Qinba Mountain Area

### 4.1 Establishment of industrial evaluation indicators

Based on the interval “AHP-DA-QCM” composite analysis method, the evaluation system of the strategic emerging and high-growth green industries in the Qinba Mountain Area is established, as shown in Table 1.

**Table 1.** Evaluation system of the strategic emerging and high-growth green industries in the Qinba Mountain Area.

First-level indicators	Second-level indicators	Third-level indicators	Calculation method
Regional analysis	Geographical location	Primacy ratio	$S=P1/P2$
	Resource endowment	Quantity and quality of resources	Resource type/total regional resources
	Traffic conditions	Transportation accessibility	Distance from the central city
Industrial evaluation	Dominant force	Industrial growth potential	Industrial added value/total industrial output value
		Employment effect standard	Employed/to be employed
	Development power	Technical efficiency standard	Technology intensity coefficient
		Risk profit standard	Risk coefficient/industrial profit rate
	Competitive power	Independent innovation	R&D input/regional GDP
		Industrial demand	Sales volume of product brands/ sales volume of industry
	Driving force	Industrial spillover effect	Sensitivity coefficient and influence coefficient
Comprehensive analysis	Greenness	Export driving	Industry exports/total national exports
		Resource consumption rate	Resource consumption/total resources
		Pollution emission rate	Pollution discharge/total pollution
	National layout	Layout area	Distribution of regional emerging enterprises
	Technology transformation	Technology maturity	Nine-level scale evaluation

*Note:*  $S$  is the primacy ratio;  $P1$  is the number of permanent residents in the primate city, in 10 000s;  $P2$  is the number of permanent residents in the second city, in 10 000s.

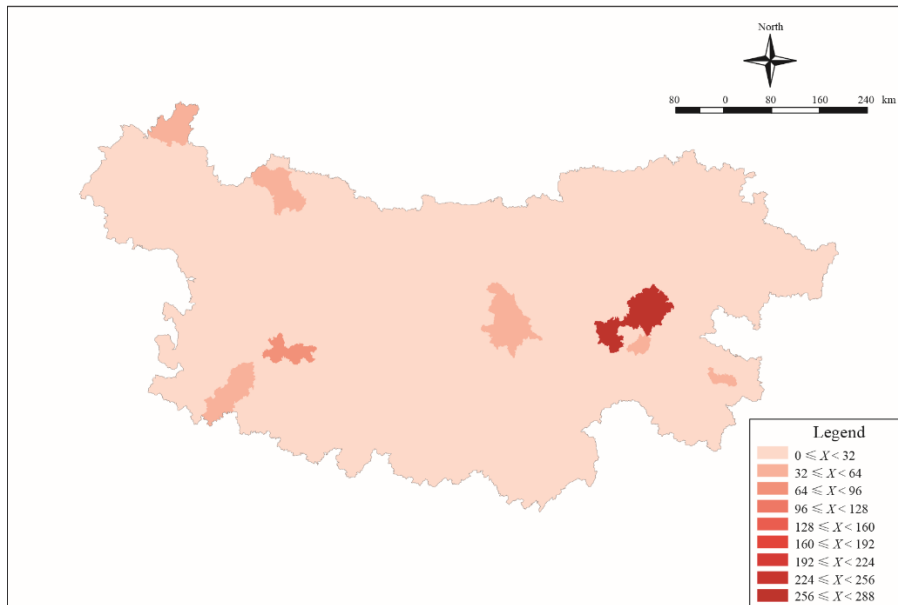
### 4.2 Screening of industrial types

Based on data from the National Corporation Industrial and Commercial Database (query on May 18th, 2019), there are 1430 strategic emerging enterprises in the Qinba Mountain Area: 240 in Shaanxi, 52 in Henan, 492 in Hubei, 357 in Sichuan, 245 in Gansu, and 44 in Chongqing. Comparing the different counties (districts and county-level cities), Yunyang District in Shiyan, Hubei Province, has the largest number—288 enterprises—showing a polarization of the strategic emerging industries. Based on these data, the number and regional distribution of strategic emerging industrial enterprises in the 119 counties (districts and county-level cities) of the five provinces and one municipality in the Qinba Mountain Area in 2019 were analyzed using a geographic information system (GIS), as shown in Fig. 1.

### 4.3 Assessment of industrial technologies

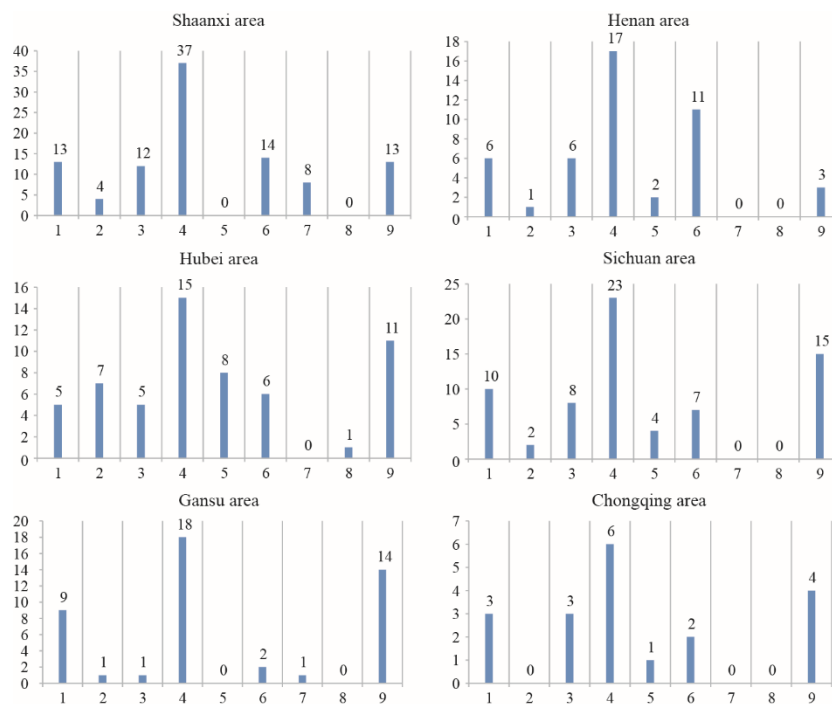
The types and numbers of strategic emerging industries in the government work reports of the last three years (2017, 2018, and 2019) of 119 counties (districts and county-level cities) in the Qinba Mountain Area are shown in Fig. 2. Based on this figure, the Qinba Mountain Area generally attaches great importance to the development of biological industries, especially modern agriculture. Among the provinces, Shaanxi attaches the highest importance to this type of industry and forms a driving effect; it is followed by related service industries, new-generation information technology industries, and new energy industries, with great development differences in regions. The foundation of the development of digital creative industries is weak, without strong development capabilities.





**Fig. 1.** Number of enterprises (X) that are strategic emerging industries in their respective counties (districts and county-level cities) in the Qinba Mountains Area in 2019.

Source: National Corporation Industrial and Commercial Database.



Legend: 1. New-generation information technology industry; 2. High-end equipment manufacturing industry; 3. New materials industry; 4. Biological industry; 5. New energy automobile industry; 6. New energy industry; 7. Energy conservation and environmental protection industry; 8. Digital creative industry; 9. Related services.

**Fig. 2.** Distribution of strategic emerging industries in the Qinba Mountain Area.

Source: 2016–2018 government work report of relevant counties and districts.

## 5 Correlation effects and distribution of strategic emerging and high-growth green industries in the Qinba Mountain Area

### 5.1 Industrial distribution principles

#### 5.1.1 Ecological priority, green circulation, and overall distribution

To adhere to the principle of ecological priority, the industrial distribution should meet the requirements of

regional ecological sensitivity. Regions with high ecological sensitivity should focus on ecological protection and develop high-growth green industries moderately. Regions with medium ecological sensitivity should vigorously develop high-growth green industries while moderately developing strategic emerging industries. For example, the rural areas around a town should mainly develop modern agriculture. Finally, regions with low ecological sensitivity should strengthen the development of strategic emerging industries.

### 5.1.2 Industrial upgrading, vocational education upgrading, and rural revitalization

Strategic emerging and high-growth green industries should be developed, industrial upgrading should be promoted, and industrial value should be enhanced. Further, to achieve the goal of rural revitalization and industrial system improvement, the vocational education and basic education systems should be optimized and the residents' vocational abilities should be improved.

### 5.1.3 Regional coordination, agglomerative evolution, and gradual development

Regional coordination should be achieved between urban agglomerations and cities with divided districts. The comparative advantages of each region should be kept in mind, and the development gap across the entire region should be narrowed. Taking the Qinba Mountain Area as an important link for the coordinated development of the surrounding urban agglomerations, full play should be given to the radiation and driving role of central cities, to promote the optimization and upgrading of the industrial structure of the entire region and the reasonable division of the industrial chains of urban agglomerations, so as to compensate for the deficiencies of Qinba Mountain Area in talent, industrial development, and so on.

As regards agglomerative evolution, adopting an agglomeration development mode, with the advantages of the scale effect and knowledge spillover effect, will play an active role in improving industrial competitiveness, optimizing resource allocation, and stimulating the technological innovation of enterprises [6].

Concerning gradual development, combined with the current situation, in the early stage, coordinated development within the urban agglomerations across the Qinba Mountain Area should be the main focus, forming five regional collaboration clusters (Fig. 3), which will gradually transform into the overall coordination of prefecture-level central cities and counties (districts and county-level cities) in the entire region.

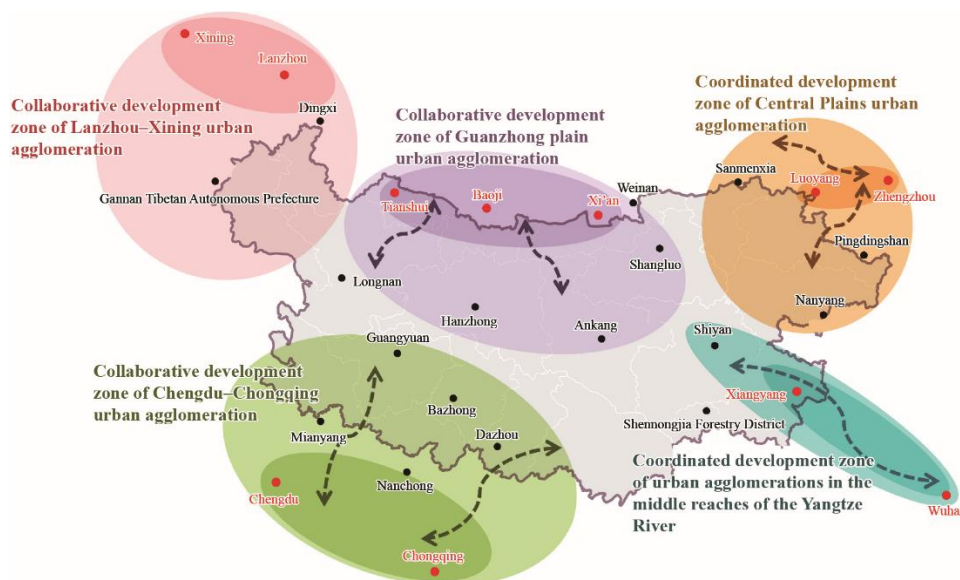


Fig. 3. Development mode for Qinba Mountain Area in the early stage.

## 5.2 Analysis of industrial distribution

Based on the regional spatial pattern of “one circle, multiple axes, one network, and two regions,” the overall distribution of strategic emerging and high-growth green industries in the Qinba Mountain Area should follow the “two-way gradient development and coordination of ecology and industry” mode, to promote the coordinated development of both ecology and industry.

A green urban-rural development mode should be created according to the ecological characteristics of the Qinba Mountain Area. This urban and rural development mode is determined through an in-depth analysis of the



ecological environment and topography of the region and is based on the adaptability evaluation of the environment's carrying capacity and national geographical space development. The river basin is taken as a unit and is combined with the collaborative characteristics of the upper, middle, and lower reaches of this basin. In this mode, the river basin is divided into four different types of units: all green, dark green, medium green, and light green. The all-green unit is a mountainous area with high ecological value and large topographic relief, which should be strictly protected and restored. The deep green unit, usually located in a mountainous area with large topographic relief and high ecological value, belongs to the restricted development area; here, green industries can only be developed within the scope allowed by the environmental bearing capacity. The medium green unit is a moderately protected area, with intensive development and optimization in terms of spatial development. The light green unit is a moderately developed area, generally located in the downstream area, where scientific and reasonable industrial establishments can be constructed [7].

### 5.2.1 Distribution of strategic emerging industries

Collaborative development zone of Chengdu–Chongqing urban agglomeration: Chengdu and Chongqing should be taken as the key core cities for collaborative development, and the central cities in Sichuan and Chongqing in the Qinba Mountain Area should be taken as the “axes” support for industrial development. Mianyang, for example, should focus on the development of new-generation information technology, high-end equipment manufacturing, new materials, biomedicine, new energy, new energy vehicles, energy conservation and environmental protection, and digital creative industries.

Coordinated development zone of urban agglomerations in middle reaches of the Yangtze River: Wuhan should be taken as the key core city for coordinated development, and the central cities in Hubei should be taken as the “axes” support for industrial development. Xiangyang, for example, should focus on the development of new-generation information technology, high-end equipment manufacturing, biomedicine, new energy vehicles, energy conservation and environmental protection, and digital creative industries.

Coordinated development zone of Central Plains urban agglomeration: Zhengzhou should be taken as the key core city for coordinated development, and the central cities in Henan should be taken as the “axes” support for industrial development. Luoyang, for example, should focus on the development of new-generation information technology, high-end equipment manufacturing, new materials, biomedicine, new energy vehicles, and digital creative industries.

Collaborative development zone of Guanzhong plain urban agglomeration: Xi'an should be taken as the key core city for coordinated development, and the central cities in Shaanxi should be taken as the “axes” support for industrial development. Baoji, for example, should focus on the development of new-generation information technology, high-end equipment manufacturing, new materials, and biomedical industries.

Coordinated development zone of Lanzhou–Xining urban agglomeration: Lanzhou and Xining should be taken as the key core cities for coordinated development, and the central city of Gansu province area in the Qinba Mountain Area be taken as the “axes” support for industrial development. The Gannan Tibetan Autonomous Prefecture, for example, should focus on the development of biomedicine and new energy industries.

The distribution of key industries for the coordinated development of strategic emerging industries in the Qinba Mountain Area is shown in Fig. 4.

### 5.2.2 Distribution of high-growth service industries

High-growth service industries should be distributed across the entire area to promote the establishment of a modern green industry system that is in line with the development trend. The construction of a public services platform and demonstration base should be completed, the innovation ability should be improved, the industrial scale should be expanded, and the development level of the services industry in the Qinba Mountain Area should be enhanced, to provide strong support for industrial transformation and upgrading.

The seven core cities in the five urban agglomerations in the Qinba Mountain Area—Chongqing, Chengdu, Wuhan, Zhengzhou, Xi'an, Lanzhou, and Xining—are the main core that will lead the overall development of high-growth service industries. The well-established prefecture central cities in the Qinba Mountain Area, such as Luoyang, Nanyang, Xiangyang, Mianyang, and so on, are key cities that will support the development of modern service industries in the region. The many prefecture-level and county-level cities such as Longnan, Guangyuan, Shangluo are multiple node cities, which will promote the establishment of a modern service industry network in the hinterland of Qinba Mountain Area.

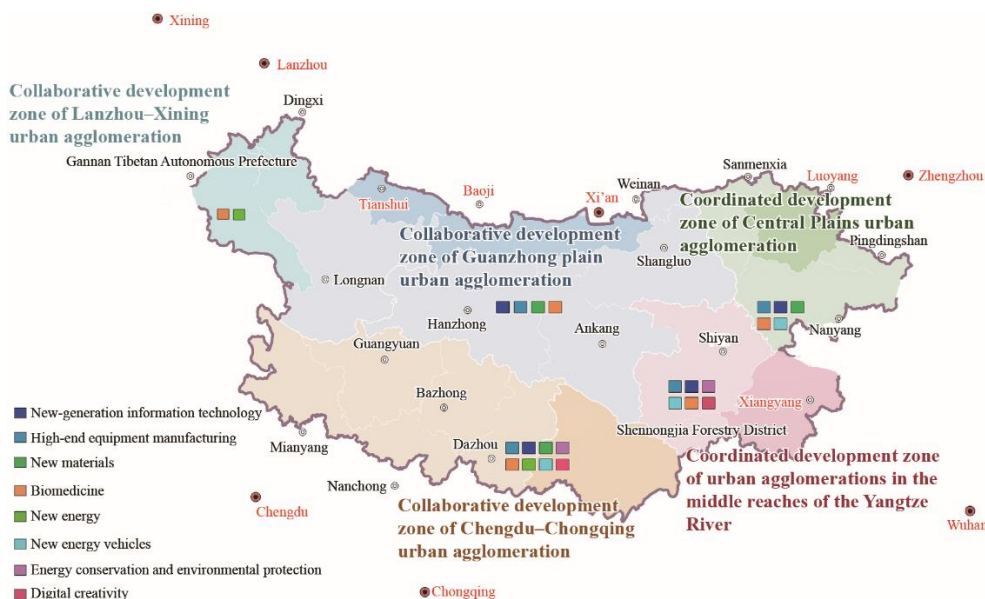


Fig. 4. Distribution of key industries for the coordinated development of strategic emerging industries in the Qinba Mountain Area.

### 5.2.3 Distribution of biomedical industry: a representative industry

#### (1) Dominant position of the biological industry in the development of regional industry

According to the statistics on strategic emerging industries in the different counties (districts and county-level cities) of the Qinba Mountain Area, biological industries are the best among the nine industry categories. The seven core cities of the five urban agglomerations in the Qinba Mountain Area are all national biological industry bases, which have gathered many technologies and talents in recent years, laying a good foundation for the future high-quality development of the entire region.

The Qinba Mountain Area is rich in Chinese herbal medicine resources but its industrialization development is insufficient. The area is located at the intersection of the north and south climate regions, and constitutes the largest biological gene bank in China. The number of animal and plant species here accounts for 75% of those in the entire country, and the number of species of medicinal animals and plants is very high. The Qinba Mountain Area is an important source and a national distribution center of traditional Chinese medicine. The planting area for traditional Chinese medicine is  $4.03 \times 10^5$   $\text{hm}^2$ , accounting for 45.09% of that of the five provinces and the one municipality in the Qinba Mountain Area, with an output amount of  $1.251 \times 10^6$  t, accounting for 49.54% of that in the five provinces and the one municipality, whose output value is estimated to be 6.75 billion yuan [8].

A coordinated development of the traditional Chinese medicine industry and the biological industry is highly feasible. The traditional Chinese medicine industry is a type of biological medicine industry. With the development of the biological industry, cities in the Qinba Mountain Area, especially the seven core cities of the five urban agglomerations, will have the advantages of the existing technologies and talents, which will provide strong support for the development of the traditional Chinese medicine industry. The biomedical industry, led by the traditional Chinese medicine industry, will become a new, advantageous industry in the region, which will further tap the rich ecological natural resources in the Qinba Mountain Area. Further, its collaboration with the strategic emerging industries in the large and medium-sized cities will enrich the original biological industry and finally result in the coordinated development of the region.

#### (2) Layout strategy of the biomedical industry

Different from the chains of other biological industries, the industrial chain of the Chinese medicine industry is very long, covering several sectors from herbal medicine planting and manufacturing to technological research. Each sector has different demands, from the environment, and for talents and technology. How to coordinate the entire industry chain and match each sector with the corresponding resources efficiently is an important issue in the development of this industry.

In the towns and villages of the Qinba Mountain Area, ecological resources, land, capital, technology, and talents exhibit great differences. Combining the characteristics of the industry chain of the biomedical industry,

which is dominated by the Chinese medicine industry, with the urban–rural development mode of this region and a scientific and reasonable industrial layout, the requirements concerning the regional ecological sensitivity of the Qinba Mountain Area can be fully met, remaining consistent with the goal of green and circular development in the entire region.

### (3) Development mode of the biomedical industry

Overall layout of the biomedical industry in the Qinba Mountain Area: In the hinterland of the Qinba Mountain Area, based on the resource advantages of Chinese traditional medicinal crops, the Chinese medicine industry, spearheaded by resources, should be the focus, accelerating the development of modern Chinese medicine and ethnic medicine manufacturing. In the urban agglomerations across the Qinba Mountain Area, based on the advantages of capital, technology, and talents of the core cities, the biomedical industry, spearheaded by technology, should be the focus, mainly promoting technological development. In terms of the research link of the industrial chain, support for pharmaceutical research should be strengthened and relevant R&D institutions in the core cities should be encouraged to set up branches in the Qinba Mountain Area, so as to gradually cultivate an R&D capacity and environment. In terms of the production link, given the ecological sensitivity of the Qinba Mountain Area, Chinese herbal medicine should be mainly planted based on ecological agriculture in the forest land of all green and dark green areas. With the mode of “production, marketing, and research,” the value of raw materials will improve and the number of intermediate links will decrease, so as to effectively improve the income of residents in the region. In the middle green and light green areas, the manufacturing link between modern Chinese medicine and ethnic medicine should be mainly focused on. Relying on a concentrated development in professional parks in small- and medium-sized cities, the development of traditional Chinese medicine should focus on cooperating with the overall industrial development of the cities and seek the support of capital, technology, and related production-oriented service industries. The proposed development mode of the biomedical industry in the Qinba Mountain Area is shown in Fig. 5.

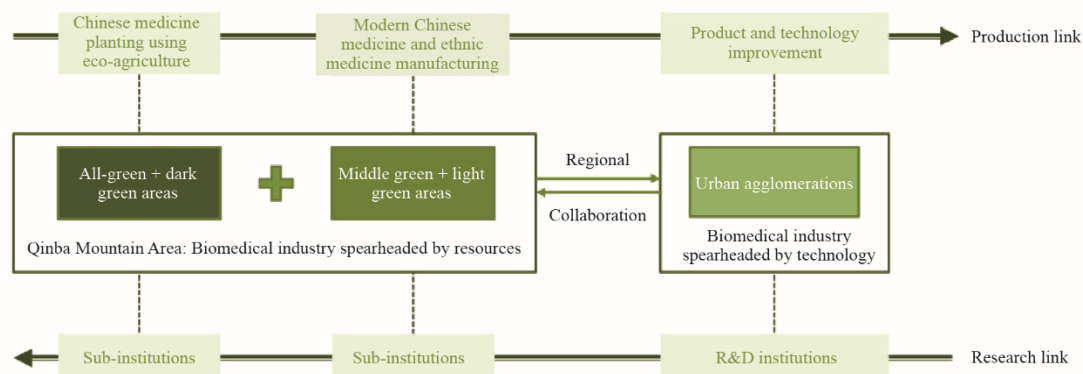


Fig. 5. Development mode for the biomedical industry in the Qinba Mountain Area.

To realize the coordinated development of the entire industry chain in the Qinba Mountain Area, it is necessary to combine the different advantages of the area and the urban agglomerations across it. Coordinating the development of the biomedical industry through the connection of intelligent platforms and rapid transportation to form an industrial network of sharing, communication, and exchanges can realize industrial division and cooperation, reduce the number of intermediate links, and improve the development efficiency.

## 6 Policy suggestions for strategic emerging and high-growth green industries in the Qinba Mountain Area

### 6.1 Industrial development path based on the green economy

An experimental region of national sustainable development in the Qinba Mountain Area should be constructed, and green ecological industry development funds across regions should be set up. High threshold industry access standards should be formulated, and the geographical indications of “Qinba tourism” and “Qinba green food” should be created [9].

### **6.2 Establishment of a cross-regional cooperation mechanism**

A joint conference system to exchange information should be established to remove administrative communication barriers, eliminate contradictions, solve problems, and share results. The establishment of a consultation mechanism for the Secretary-General of the government should be promoted, cross-regional cooperation should be urged, coordinated, and organized. Further, a “Qinba Forum” should be established to promote academic exchanges.

### **6.3 Excellent talents for the development of the green industry**

A multi-level talent pool should be established to provide human capital support for industrial development. The training direction of higher vocational colleges in the region should be adjusted, and the appropriate abilities of regional talents should be improved [10].

### **6.4 Increase in the input of green capitals**

Under the guidance of government financial funds, special funds should be established by using social capital to vigorously promote ecological industrialization and industrial ecology. Various financing modes should be explored to promote the integrated development of ecology and industry. Venture investment should be attracted through incentive measures and policies to encourage the rapid development of green finance.

### **6.5 Active combination of the green industry and rural revitalization**

A plan for the development of a digital economy strategy should be formulated, a pilot project of an Internet Plus Digital Economy should be organized and implemented, and a comprehensive cross-regional strategic industry innovation center should be constructed, so as to ensure the quality of life of the people in the region and the smooth progress of poverty alleviation.

### **6.6 Cultivation of social enterprises and institutional entrepreneurs**

Social enterprises and institutional entrepreneurs are currently extremely scarce resources in China. The state needs to increase support from the entire society to cultivate social enterprises and institutional entrepreneurs, and give full play to institutional entrepreneurs to develop strategic emerging and high-growth green industries in the Qinba Mountain Area [11].

### **6.7 Market mechanism to promote the integrated development of the green industry**

The business management and industrial operation of the construction projects of the strategic emerging and high-growth green industries should be promoted, using methods such as owner bidding and project management rights transfer, to promote the projects in the market [12]. Special attention should be paid to the introduction of private capitals, realizing the market-oriented operation of industrial projects and strengthening the self-reliance of the industry.

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