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Evaluation of High-Quality Development in the Shaanxi-Gansu-Ningxia Region from the Perspective of Common Prosperity

Chongyang Zhang[a], Yongjuan Shan[a]*, Yijun Wu[a]

a. College of Urban Geology and Engineering, Hebei GEO University, Hebei, 050030, China

Abstract: Given the driving and radiating effect of urban high-quality development on the Shaanxi-Gansu-Ningxia region, this paper aims to promote the realization of the goal of common prosperity in the region and provide more comprehensive references for the strategic planning and implementation paths of high-quality regional development. From the perspective of common prosperity, this study constructs an evaluation index system for high-quality development and employs the entropy weight method to measure the high-quality development levels of nine prefecture-level cities in the Shaanxi-Gansu-Ningxia region from 2018 to 2022. It further uses a coupling coordination model to assess the level of coordinated development in the region. The results show that the overall level of high-quality development in the region is steadily improving, with all cities showing positive development trends. Xi'an, Lanzhou, and Yinchuan are at the forefront. Although the region is in a stage of low coordination, its coordination level is gradually improving, with Xi'an, Lanzhou, and Yinchuan leading in coordination as well. It is recommended that the government continue to enhance coordination among cities to promote integrated regional development.

Keywords: Shaanxi-Gansu-Ningxia region; common prosperity; high-quality development; entropy method; coupling coordination.

1. Introduction

General Secretary Xi Jinping stated: "High-quality development is development that can well meet the growing needs of the people for a better life" [1]. This indicates that the criterion for judging developmental quality lies in whether it meets people's increasing demand for a better life. However, the connotation of a better life is not limited to economic fields represented by material needs; it should extend to include quality ecological environments and harmonious social developments, such as improvements in quality of life, production, and the environment, with the core objective being the promotion of comprehensive human development.

Additionally, in the report of the 20th National Congress of the Communist Party of China, Xi Jinping emphasized that "Chinese-style modernization is the modernization of a huge population and the modernization of common prosperity for all people" [2]. This reveals that common prosperity is an essential requirement of socialism with Chinese characteristics and the goal of social development.

In this new stage of development, the concept of common prosperity has been enriched and expanded. It should not be viewed solely from a distributional perspective; instead, it permeates the entire process of social production and fundamentally concerns human development. It relates not only to the quality and standard of life but also to production efficiency, sustainability, and the protection and improvement of the ecological environment.

Common prosperity is about affluence for all people, while high-quality development is centered on people. Therefore, the aim and fundamental goal of high-quality development in China is to continuously improve the

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Corresponding email: 594462797@qq.com (Yongjuan Shan)
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living standards of its residents. Prosperity is prosperous and is both an important pathway and a standard for achieving high-quality development.

Looking at existing literature on measuring high-quality development, most scholars have constructed evaluation index systems from different angles. For example, Gao Zhigang, Wei Xiujian, Bu Wei, and Li Mengxin developed index systems based on the new development philosophy [3],[6]. Huang Huan added the dimension of total development [7]. Xu Yongbing assessed the high-quality development of the Beijing-Tianjin-Hebei urban cluster across six dimensions, including innovation, structural optimization, economic stability and vitality, livelihood improvement, and ecological friendliness [8]. Shi Bo et al. considered development fundamentals, social outcomes, and ecological results [9]. Xu Hui et al. evaluated the Yellow River Basin from five perspectives, including economic development, innovation, livelihood, environmental and ecological conditions [10]. Han Yonghui analyzed the dynamic evolution and provincial differences of high-quality development based on transformation of development models, structural optimization, and growth driver conversion [11]. Liu Chang measured livelihood quality from five perspectives: economic development, living quality, public services, social environment, and development balance [12]. and Liu Jiaqi et al. developed an index system from the perspective of public perception [13]. In addition to the construction of the evaluation system, the above-mentioned scholars have different research scales. Among them, Bu Wei and others measured and compared the development level of the Beijing-Tianjin-Hebei, Yangtze River Delta, Guangdong-Hong Kong-Macao Greater Bay Area in 2011-2020; Wei Jianjian and other scholars focused on the inter-provincial level and analyzed the development quality of 31 provinces and seven major regions in 2012-2016; Gao Zhigang and others built a five-dimensional evaluation system for provinces and regions along the border; Huang Huan's team focused on the national provincial comparison, Xu Hui's team specialized in the Yellow River Basin, and the Shibo team covered the prefecture-level cities across the country.

In terms of research regions, the existing research has discussed high-quality economic development from multiple scales, such as urban clusters, inter-provincial, and border provinces and regions. However, as a typical area in the northwest inland, the development path and mechanism of the Shaanxi-Ganning region have not been systematically revealed. At the same time, the strategic position of the region in the revitalization of old revolutionary areas, ecological protection, and regional coordination. Therefore, it is of great value to carry out targeted research on the region to improve the theoretical system of high-quality development and formulate differentiated policies. From the perspective of the construction of the index system, the index system built by the above-mentioned scholars provides a useful reference for measuring the level of high-quality development, but the existing studies have less about people's happiness. Therefore, this article combines the national development strategy, stands from the perspective of the whole people, and builds high-quality development from the perspective of common prosperity. The measurement system of development comprehensively evaluates the high-quality development of the Shaanxi-Ganning regions.

The research in this article not only provides strong support for the sustainable and healthy development of the region. At the same time, it can also provide valuable experience and inspiration for other similar regions to jointly promote the realisation of the goal of common prosperity.

2. Research Design

2.1 Research Framework

This study is grounded in the theoretical framework of regional development and adopts a perspective of common prosperity to construct an evaluation index system for high-quality development in the Shaanxi-Gansu-Ningxia region. The index system includes three dimensions: living conditions, production, and ecology. First, the original data is standardized using the range method to eliminate dimensional differences. The entropy weight method is then used to determine the weight of each indicator and calculate the high-quality development scores for cities in the region. Finally, a coupling coordination model is introduced to quantitatively evaluate the degree of coordination among the subsystems of living, production, and ecology, thereby revealing the internal coordination mechanism of development in the region.

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2.2 Research Objects and Data Sources

2.2.1 Research Objects

The research focuses on cities within the Shaanxi-Gansu-Ningxia region. Considering multiple dimensions—such as economic development, industrial structure, urban-rural gaps, ecological protection, and the equalization of public services—nine representative and diverse cities were selected: Xi'an, Yan'an, Yulin, Lanzhou, Qingyang, Tianshui, Yinchuan, Guyuan, and Wuzhong. These cities include core regional cities, resource-based cities, and underdeveloped areas, providing a comprehensive reflection of the region's development diversity and complexity. Therefore, selecting these cities as research objects enables more accurate measurement of high-quality urban development levels and provides scientific and practical support for promoting common prosperity in the region. See Table 1 for specific cities.

Table 1: Research Cities

Province/Region	Cities
Shaanxi Province	Xi'an, Yulin, Yan'an
Gansu Province	Lanzhou, Qingyang, Tianshui
Ningxia Hui Autonomous Region	Yinchuan, Wuzhong, Guyuan

2.2.2 Data Sources

The indicator data used in this paper are primarily sourced from the China Urban Statistical Yearbook, statistical yearbooks of the provinces (regions) within Shaanxi, Gansu, and Ningxia, local city statistical yearbooks, and government bulletins. Missing data was supplemented using interpolation methods where necessary.

2.3 The Connotation and Evaluation Indicator System of High-Quality Development from the Perspective of Common Prosperity

2.3.1 Connotation of High-Quality Development from the Perspective of Common Prosperity

Social high-quality development refers to comprehensive development across all dimensions of society. The academic community has provided relatively clear definitions of the connotation of high-quality development. For instance, Li Jinchang and others argue that high-quality development is a model of sustainable economic vitality driven by innovation, emphasizing green sustainability and the continuous improvement of living standards and human quality [14]. Sun Jiuwen and others believe that high-quality development involves the construction of urban systems, integrated infrastructure and public services, industrial upgrading, ecological optimization, and coordinated regional policies, emphasizing economic growth, industrial strength, innovation, openness, and green development [15].

This paper contends that high-quality development, under the goal of common prosperity, entails comprehensive progress in economic prosperity, social harmony, and ecological well-being, with the aim of enhancing the well-being of all people. From the perspective of common prosperity, high-quality development encompasses three core dimensions. First, it is development that stimulates productive vitality [16]. By optimizing resource allocation, improving industrial efficiency, and activating market dynamics, a solid material foundation is laid for achieving common prosperity. The high-quality development of production emphasizes the sustainability of economic growth, upgrading of industrial structures, and comprehensive improvement of productivity [17]. Second, it stresses continuous improvement in the quality of life. On the path to common prosperity, the public's living demands have shifted from basic survival to higher-level pursuits, seeking a wealthier, fairer, and more dignified life. High-quality development is oriented toward satisfying the people's growing needs for a better life by enhancing public service levels and narrowing gaps between urban and rural areas, regions, and social groups [18]. Third, it emphasizes harmonious coexistence with the ecological environment [19]. While pursuing economic growth, it also focuses on environmental protection, achieving a positive interaction between development and ecological preservation. Common prosperity requires not only material wealth but also a quality ecological environment so that people may enjoy the achievements of both material and ecological civilization.

2.3.2 Evaluation Indicator System of High-Quality Development from the Perspective of Common Prosperity

This paper adheres to the principles of scientificity, systematicness, foresight, and data accessibility in selecting indicators.

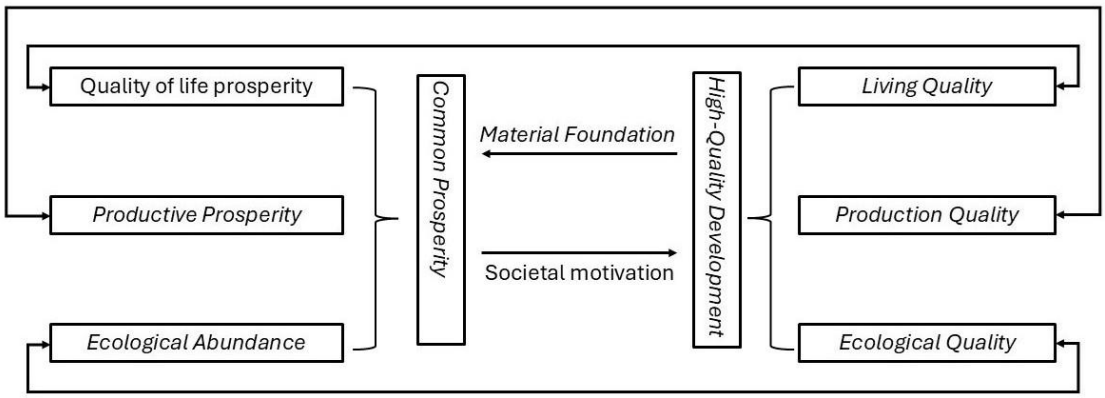

Figure 1: Relationship between Common Prosperity and High-Quality Development

Based on the intrinsic relationship between common prosperity and high-quality development (as shown in Figure 1) and considering the actual conditions of the Shaanxi-Gansu-Ningxia region, the high-quality development level of the region is assessed across three dimensions: living, production, and ecology. Specific indicators are listed in Table 2.

Table 2: Evaluation Indicator System for High-Quality Development in the Shaanxi-Gansu-Ningxia Region

Dimension	Secondary Indicator	Tertiary Indicator	Method	Attribute	Weight
Living	Income Level	Per Capita Disposable Income/Yuan	Statistical Data	+	0.038
		Urban–Rural Disposable Income Ratio	Urban income / Rural income	−	0.020
	Consumption Level	Per Capita Consumption Expenditure/Yuan	Statistical Data	+	0.038
		Urban–Rural Consumption Ratio	Urban consumption / Rural consumption	−	0.021
	Education Level	Education Spending per 10,000 People/Ten thousand yuan	Education spending / Resident population (×10,000)	+	0.026
		University Students per 10,000 People/Persons	Higher ed enrollment / Resident population (×10,000)	+	0.083
	Medical Services	Hospital Beds per 10,000 People	Hospital beds / Resident population (×10,000)	+	0.031
		Medical Staff per 10,000 People/Persons	Medical staff / Resident population (×10,000)	+	0.029

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	Social Security	Unemployment Insurance Enrollment/Persons	Statistical Data	+	0.117
		Registered Urban Unemployment Rate/Percent	Statistical Data	−	0.011
	Infrastructure	Communication Infrastructure Level	Internet Users (10,000 households)	+	0.077
Production	Economy	Per Capita GDP/Yuan	Statistical Data	+	0.040
		GDP Growth Rate/Percent	Statistical Data	+	0.008
		Local Budget Revenue per Capita/Yuan	Statistical Data	+	0.034
	Structural Optimization	Contribution of Primary Industry/Percent	Statistical Data	+	0.046
		Contribution of Secondary Industry/Percent	Statistical Data	+	0.029
		Contribution of Tertiary Industry/Percent	Statistical Data	+	0.025
	Innovation Capacity	R&D Spending/Percent	R&D Spending as % of GDP	+	0.071
		Number of Patent Authorizations	Statistical Data	+	0.163
Ecology	Pollution	Industrial Wastewater Discharge/10000 tons	Statistical Data	−	0.011
		Industrial SO_2 Emissions/tons	Statistical Data	−	0.008
		PM2.5 Annual Average Concentration/ (Microgram/cubic metre)	Statistical Data	−	0.010
	Ecological Development	Per Capita Green Space/Square metre	Statistical Data	+	0.059
		Harmless Waste Disposal Rate/Percent	Statistical Data	+	0.006

3. Methodology

3.1 Entropy Weight Method

The entropy weight method is a method to measure the difference and importance of indicators by calculating the information entropy of each indicator to determine the weight of each indicator. Information entropy is a concept in information theory that is used to measure the uncertainty of information. In the entropy weight method, the smaller the information entropy of the indicator, the greater the difference of the indicator, the greater its role in decision-making, and the higher the corresponding weight.

This study quantitatively evaluates the high-quality development level of the Shaanxi-Gansu-Ningxia region using the entropy weight method based on the multidimensional indicator system established earlier. The entropy method objectively determines indicator weights by measuring the degree of variation in the data, reducing subjective bias, and revealing information differences among indicators. The specific calculation steps are as follows:

First, standardize the original data using the range method. To ensure meaningful data processing, standardized data are shifted. Positive and negative indicators are normalized using formulas 1 and 2:

Positive indicator normalization formula:

$$X'_{ij} = \frac{X_{ij} - \min(X_{ij})}{\max(X_{ij}) - \min(X_{ij})} \quad (1)$$

Negative indicator normalization formula:

$$X'_{ij} = \frac{\max(X_{ij}) - X_{ij}}{\max(X_{ij}) - \min(X_{ij})} \quad (2)$$

Where:

I represent the year,
j represents the indicator,
X_{ij} Is the original level of High-Quality Development in the Shaanxi-Gansu-Ningxia Region,
X'_{ij} Is the normalized value,
max $(X_{ij})$and min (X_{ij}) Are the maximum and minimum values of indicator j, respectively.

After standardization, calculating the proportion of the j-th indicator in year I is performed. See formula 3.

$$P_{ij} = \frac{X'_{ij}}{\sum_{i=1}^{n} X'_{ij}} \quad (3)$$

Where is the total number of cities (or observations)?
Thirdly, based on the standardized value X'_{ij} We calculate the information entropy. E_j For each indicator. Refer to formula 4.

$$E_j = -\ln\frac{1}{n}\sum_{i=1}^{n} P_{ij} ln(P_{ij}) \quad (4)$$

Where n denotes the years of evaluation
Using the entropy value E_j, calculate the weight W_j Of each indicator.

$$W_j = (1 - E_j) / \sum_{j=1}^{m}(1 - E_j) \quad (5)$$

Where m is the total number of indicators.
Using the standardized indicator values, X'_{ij}, and the computed weights, W_j, calculate the high-quality development index S_i For each year.

$$S_i = \sum_{j=1}^{m} W_j X'_{ij} \quad (6)$$

The weights calculated from formulas 1 to 5 are listed in Table 1.

3.2 Coupling Coordination Model

The coupling coordination model is a tool used to quantitatively evaluate the interaction strength and dynamic relationship among multiple systems [20]. It constructs a network of associations among elements to reveal the degree of synergy, mutual constraints, and influence paths between subsystems, thereby offering a scientific basis for system optimization.
To measure the coordination among the living, production, and ecological subsystems in the high-quality development of the Shaanxi-Gansu-Ningxia region, the following formulas are used:

$$D = \sqrt{T \times C} \quad (7)$$

$$T = \alpha a(x) + \beta b(x) + \gamma c(x) \quad (8)$$

$$C = 3 \times \frac{\sqrt[3]{a(x) \times b(x) \times c(x)}}{a(x) + b(x) + c(x)} \quad (9)$$

Where:

D is the coupling coordination degree (CCD),
C is the coupling degree,
T is the comprehensive evaluation index of high-quality development in the Shaan-Gan-Ning region,
α, β, and γ represent the contribution coefficients of each indicator dimension under the high-quality development indicator system of the region,
a(x), b(x), and c(x) represent the efficiency of each indicator dimension.

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Table 3: Coupling Coordination Degree Classification

Coordination Degree	Description
0-0.200	Dysfunctional
0.201-0.400	Low coordination
0.401-0.600	Moderate coordination
0.601-0.800	High coordination
0.801-1.000	Excellent coordination

4. Findings

4.1 Analysis of High-Quality Development Levels in the Shaanxi-Gansu-Ningxia Region

4.1.1 Measurement of High-Quality Development Levels

By substituting each indicator into the formulas and performing comprehensive calculations based on the classification standards in Table 2, the overall high-quality development scores of cities in the Shaanxi-Gansu-Ningxia region were obtained. The development index ranges from 0 to 1, with a higher value indicating a higher level of high-quality development.

Overall, the cities in the region show a steady upward trend in high-quality development. Xi'an's development index increased from 0.481 in 2018 to 0.689 in 2022, a growth of 43.2%, maintaining a leading position in the region. Lanzhou and Yinchuan followed closely, forming the first tier of regional high-quality development.

In terms of growth rate, Yulin, Xi'an, and Wuzhong performed particularly well. Their indices increased from 0.227, 0.481, and 0.209 in 2018 to 0.337, 0.689, and 0.295 in 2022, representing growth rates of 48.5%, 43.2%, and 41.1%, respectively. See Table 4 for the specific results.

Xi'an led the region throughout 2018–2022, benefiting from balanced urban-rural development, industrial optimization, improved public services, and environmental management. Strategies like rural revitalization and digital rural development helped integrate urban and rural areas.

Yulin, a fast-developing energy-rich city, formed a core industrial structure around the energy and chemical industries. From 2018 to 2022, its secondary industry contributed an average of 66.24% to GDP. The energy industry also absorbed rural Labor, raising income levels and narrowing urban-rural income gaps—thereby supporting balanced development. Thus, the growth of the secondary industry has played a vital role in Yulin's high-quality development.

Table 4: High-Quality Development Levels in the Shaanxi-Gansu-Ningxia Region (2018–2022)

City	2018		2019		2020		2021		2022	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Xi'an	0.481	1	0.540	1	0.581	1	0.681	1	0.689	1
Yulin	0.227	4	0.253	4	0.254	5	0.291	4	0.337	4
Yan'an	0.206	6	0.228	5	0.231	7	0.247	7	0.265	7
Lanzhou	0.350	2	0.380	2	0.444	2	0.415	2	0.441	2
Qingyang	0.139	9	0.163	9	0.181	9	0.203	9	0.191	9
Tianshui	0.163	8	0.185	8	0.213	8	0.224	8	0.227	8
Yinchuan	0.324	3	0.338	3	0.302	3	0.332	3	0.345	3
Wuzhong	0.209	5	0.225	6	0.243	6	0.268	6	0.295	5
Guyuan	0.200	7	0.208	7	0.275	4	0.272	5	0.267	6

4.1.2 Regional Comparison of Development Levels

To provide a more comprehensive understanding of the region's development, provincial-level comparisons were conducted among Shaanxi, Gansu, and Ningxia. See Table 5 for details. In terms of average scores, Shaanxi Province consistently achieved the highest values from 2018 to 2022. Shaanxi's index grew from 0.305 to 0.430

(41% growth); Gansu's from 0.217 to 0.286 (31.8% growth); and Ningxia's from 0.244 to 0.302 (23.8% growth). This shows that Shaanxi had the most rapid improvement.

Regarding regional development gaps, the difference between Shaanxi and Gansu widened from 0.088 in 2018 to 0.144 in 2022. The gap between Shaanxi and Ningxia increased from 0.061 to 0.128. The gap between Gansu and Ningxia narrowed slightly from 0.027 to 0.016. These results suggest that the gap between Gansu/Ningxia and Shaanxi is growing, making it necessary to strengthen the development of Gansu and Ningxia to promote balanced regional growth and achieve common prosperity.

In Shaanxi, Xi'an leads, followed by Yulin and Yan'an. Yan'an promoted petroleum refining through industrial upgrading and developed a dual structure of "energy as the base and culture-tourism as a driver." Its second industry maintained a contribution rate of 55–65%. Income gaps narrowed due to apple industry upgrades and employment-driven poverty alleviation efforts. However, Yan'an still faces constraints like talent shortages, weak innovation, and limited ecological capacity—posing challenges to its transformation and long-term growth.

In Gansu, Lanzhou is far ahead, followed by Tianshui and Qingyang. Qingyang built a robust industrial system centered on energy and chemicals and developed digital economy clusters by establishing national data centers. However, it still relies heavily on traditional industries and faces pressure for a green transition. Environmental indicators such as wastewater and SO_2 emissions present sustainability challenges. Its digital sector is growing, but innovation inputs lag behind Lanzhou and Tianshui. Public service provision also remains inadequate, especially in education and healthcare. To advance, Qingyang needs to decarbonize its energy sector, expand the digital economy, and improve public services.

In Ningxia, Yinchuan ranks first, followed by Wuzhong and Guyuan. From 2018 to 2022, Wuzhong and Guyuan's indices rose from 0.209 and 0.200 to 0.295 and 0.267, showing strong growth (41.1% and 32.5%). Wuzhong implemented a dual-track recruitment strategy to attract talent and boost R&D. However, urban-rural disparities remain, and public services, especially education, are weaker than in Yinchuan. Wuzhong should prioritize rural income growth and service equalization.

Table 5: Regional Development Levels in the Shaanxi-Gansu-Ningxia Region (by Province)

Region	City	2018		2019		2020		2021		2022	
		Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Shaanxi	Xi'an	0.481	1	0.540	1	0.581	1	0.681	1	0.689	1
	Yulin	0.227	2	0.253	2	0.254	2	0.291	2	0.337	2
	Yan'an	0.206	3	0.228	3	0.231	3	0.247	3	0.265	3
	Average	0.305		0.340		0.355		0.406		0.430	
Gansu	Lanzhou	0.350	1	0.380	1	0.444	1	0.415	1	0.441	1
	Qingyang	0.139	3	0.163	3	0.181	3	0.203	3	0.191	3
	Tianshui	0.163	2	0.185	2	0.213	2	0.224	2	0.227	2
	Average	0.217		0.243		0.279		0.281		0.286	
Ningxia	Yinchuan	0.324	1	0.338	1	0.302	1	0.332	1	0.345	1
	Wuzhong	0.209	2	0.225	2	0.243	3	0.268	3	0.295	2
	Guyuan	0.200	3	0.208	3	0.275	2	0.272	2	0.267	3
	Average	0.244		0.257		0.273		0.291		0.302	

4.2 Analysis of Coordinated Development Levels in the Region

Achieving common prosperity requires coordinated and balanced development across cities. By inputting standardized data into formulas (7–9), the coordination levels of each city from 2018 to 2022 were calculated (see Table 6). Results show that overall coordination levels in the region are low. However, Xi'an, Lanzhou, and Yinchuan show relatively high coordination in high-quality development. Wuzhong and Yulin also improved, with their coordination indices rising from 0.260 and 0.254 in 2018 to 0.310 and 0.302 in 2022—growth rates of 19.2% and 18.9%. Although Tianshui had a lower coordination index, it still showed improvement (18.9% growth). In contrast, Qingyang remained at the bottom throughout the period, indicating that its economic development did not effectively integrate improvements in living standards, production, and the ecological

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environment. To achieve higher levels of equilibrium, it is critical to optimize industrial structures, coordinate urban and rural development, and balance regional priorities.

Table 6: Coupling Coordination Degree of Cities in the Shaanxi-Gansu-Ningxia Region (2018–2022)

City	2018		2019		2020		2021		2022	
	CCD	Rank	CCD	Rank	CCD	Rank	CCD	Rank	CCD	Rank
Xi'an	0.314	1	0.329	1	0.354	1	0.378	1	0.373	1
Yulin	0.254	5	0.268	5	0.270	6	0.284	6	0.302	5
Yan'an	0.250	7	0.260	6	0.261	7	0.268	7	0.277	7
Lanzhou	0.291	3	0.302	2	0.324	2	0.314	2	0.326	2
Qingyang	0.211	9	0.226	9	0.237	9	0.250	9	0.250	9
Tianshui	0.222	8	0.236	8	0.255	8	0.263	8	0.264	8
Yinchuan	0.296	2	0.301	3	0.281	4	0.298	4	0.304	4
Wuzhong	0.260	4	0.270	4	0.279	5	0.293	5	0.310	3
Guyuan	0.252	6	0.256	7	0.301	3	0.300	3	0.296	6

5. Strategies and Recommendations

Based on the above analysis and discussion, the following strategies and recommendations are proposed to further improve the level of common prosperity and high-quality development in the Shaanxi-Gansu-Ningxia region.

First, local governments need to adapt to local conditions and provide targeted support. Cities such as Qingyang and Tianshui have long remained in relatively underdeveloped positions. Local governments should develop differentiated support strategies based on regional resource endowments and development characteristics. Guided by an eco-prioritized approach, they should promote livelihood-improving projects, systematically plan urban-rural coordinated development paths, increase fiscal transfer payments, and prioritize the allocation of public resources. These multi-pronged measures can help comprehensively enhance regional development capabilities.

Secondly, governments should stimulate vitality and strengthen innovation. For example, cities with relatively strong economies, such as Xi'an, Lanzhou, and Yinchuan, should continue to advance the construction of innovation hubs. Xi'an should capitalize on its concentration of scientific and educational resources to accelerate the transformation of scientific achievements and build a "hard tech capital." Lanzhou should leverage the "Strong Provincial Capital Strategy" to drive the green transformation of traditional industries like petrochemicals. Yinchuan can take advantage of its inland port and multi-directional logistics corridors to enhance openness and cooperation, utilize digital and green technologies to improve the resilience of its industrial chains, and convert ecological resources into economic value.

Thirdly, governments should optimize structures and improve efficiency and quality. For instance, Yulin and Yan'an, as resource-based cities, should leverage their industrial strengths to accelerate the development of the tertiary sector, addressing the issue of industrial structure imbalance. Last but not least, the improvement of social security and promoting educational equity are essential. In terms of social security, Guyuan should focus on raising the level of unemployment insurance coverage; Wuzhong should increase healthcare investment, especially in underserved rural and minority areas. Ensuring equal access to education and public services across urban and rural areas is essential for narrowing disparities and promoting inclusive growth.

6. Conclusion

This study constructed an evaluation index system for high-quality development in the Shaanxi-Gansu-Ningxia region and applied both the entropy weight method and coupling coordination model to analyze development levels and coordination degrees from 2018 to 2022. The results show that: first, the overall development quality and coordination degree of cities in the region are relatively low, but there is a clear trend of continuous improvement. Second, Xi'an, Lanzhou, and Yinchuan lead the region in terms of comprehensive development,

forming the first tier. Third, Wuzhong, Yulin, and Tianshui show strong growth momentum and significant potential. However, the development gap between Shaanxi and the other two provinces (Gansu and Ningxia) has widened, posing challenges for regional balance. To achieve the goal of common prosperity, the region must promote coordinated urban-rural and inter-regional development, optimize industrial layouts, improve social security systems, strengthen scientific and educational support, and enhance ecological protection. These comprehensive measures can address regional development imbalances and support the path to sustainable, inclusive growth.

This study also has some limitations. On the methodological level, there is room for optimization. The current indicator system does not fully cover certain key dimensions. Future research will expand the variable dimensions and build a more comprehensive evaluation framework to fully capture the quality of regional development.

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Data availability
The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent
Not applicable. This study uses publicly available, de-identified secondary data and does not involve human participants or personal information.

Competing interests
The authors declare no competing interests.

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