Coupling analysis of land space development and protection and economic and social development in Julu County

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Abstract. In the stage of rapid development of urban economic society, some cities adopt the compact land and space development strategy to control the unlimited expansion of cities. However, the effect is counterproductive. It not only hinders the development of urban social economy, but also leads to a wider range of suburban urbanization and rapid urban sprawl. On the other hand, if the aggressive urban expansion plan is adopted to speed up the urban development, it will lead to more waste of land space resources and ineffective precipitation of investment. Such land space development strategy is also the fetter of urban development. Therefore, the tight and aggressive land and space development strategies are the constraints of urban economic and social development. In view of this, only by understanding the macro background of the economic and social development of Julu County, analyzing the relationship between the use of land space and economic and social development, scientifically formulating the strategy of land and space utilization of Julu County, can we achieve the strategic goal of orderly and harmonious economic and social development. This paper will use SPSS software to analyzing the correlation between socioeconomic data and land use data. Using the results to specifically and quantitatively analyze the relationship between social economic development and land space development and utilization. The result shows that the urban land area is positively correlated with multiple economic data, the development of towns has a positive effect on the economy. But reasonable land use planning and effective protection of the ecological environment are still essential.

1. Survey and significance of the study area
Julu, a county in Hebei province, is located on the alluvial plain of the ancient Yellow River and Zhanghe River in the east of Taihang. It borders Nangong and Guangzong in the East, Longyao and Renxian in the west, Ningjin and Xinhe in the north and Pingxiang in the south. The convergence of multiple development strategies has guided the new direction of Julu's development, and the industrial transfer between Beijing and Tianjin and the eastern region has injected new impetus into Julu's development. In 2015, the Beijing-Tianjin-Hebei coordinated development strategy, which was incorporated into the national strategy, was officially promulgated, positioning Xingtai as a national new energy industrial base, an industrial transformation and upgrading demonstration area, and a logistics hub city in central and Southern Hebei province. Xiong'an new district, a national new area decided by the CPC Central Committee and the State Council in 2017, requirements in accordance with the requirements of high-quality development,
Xiongan new district and Beijing Urban sub center should be promoted to form two wings of Beijing, and the construction of Zhangbei area should be promoted with the opportunity of 2022 Beijing Winter Olympic Games and winter Paralympic Games, so as to promote the coordinated development of Beijing, Tianjin and Hebei. This is of great practical and far-reaching historical significance for exploring the new mode of optimizing the development of densely populated and economically intensive areas, adjusting and optimizing the urban layout and spatial structure of Beijing, Tianjin and Hebei, and cultivating a new engine of innovation driven development.

2. Current situation of land space development and protection

2.1. current situation of land space utilization

In 2019, the land use in Julu County is dominated by agricultural land, with agricultural land accounting for 83.00% of the total land area, construction land accounting for 15.68% of the total land area, and the land utilization rate is about 99%, which is higher than the average level of the whole city. Cultivated land is the main agricultural land, accounting for 58.68% of the total land area. It is the important grain and cotton production base in Xingtai city.

In terms of space, the ecological space is presented in the form of block and line. The block ecological space is mainly concentrated in the southwest, most of which are commercial forest, and the proportion of public welfare forest is relatively low; the linear ecological space is mainly water area and forest belt, which are distributed on both sides of rivers and high-grade roads, and part of water space is occupied. Agricultural space is widely distributed in the whole region, mainly cultivated land. The northern, western and southern cultivated land is highly contiguous, and the eastern cultivated land and forest is mixed. The total area of agricultural land is decreasing year by year, and the agricultural space is shrinking. The urban space is dominated by urban and rural construction space. There is a small amount of mining land in the northern villages and towns. The village scale is generally large, the construction area is increasing year by year, and the construction space is expanding continuously.

2.2. current situation of land and space protection

The ecological protection red line in Julu County is mainly distributed along Fuyang River and Laozhang River. Julu County vigorously promotes the reclamation and ecological restoration of abandoned land, and actively guides social forces to participate in environmental governance. The forest land of the whole county shall be divided, classified and graded to determine the direction, key points, policies and main measures of forest land protection and utilization, so as to guarantee the demand of forest land for key public welfare forest, key engineering construction, production base of wood and forest products, ecological environment, etc. Different protection and utilization policies should be implemented for different regions (types) of woodland, so as to standardize the order of forest land utilization, promote regional coordination of forest land utilization, and ensure the maximum overall benefit of forest land protection and utilization in the whole county. In the urban greening construction, community greening construction and green model rural construction, the plant landscape idea with arbor as the main body is carried out. The construction of suburban ecological scenic forest, urban and rural ecological corridor, and water system forest network system should be carried out, so as to plant trees as much as possible.

3. Dynamic analysis of land space development and protection

According to the third national land survey and the land use status classification in "Land Administration Law of the People's Republic of China", the three general classifications of land use are divided into agricultural land, construction land and unused land. In the analysis, the land data of the third national land survey are taken as the data of 2019. From 2010 to 2018, the proportion of agricultural land, construction land and unused land in the total area of Julu County is adjusted from 82:13:5 to 81:14:5, and the proportion is 83:16:1 in 2019.
3.1. **dynamic analysis of development and protection of agricultural land**

Agricultural land includes cultivated land, garden land, woodland, grassland and other agricultural land. From 2010 to 2019, the area of agricultural land firstly decreased and then increased. In 2017, the agricultural area was the smallest, accounting for 80.7% of the total area; in 2019, the agricultural land area was the largest, accounting for 83.00% of the total area. Agricultural land area decreased by 1% in 2010-2018 and increased by about 2% in 2018-2019.

In terms of cultivated land area, it accounted for 81.68% of agricultural land area in 2010, the largest in 2018, accounting for 82.21% of agricultural land area, and the smallest in 2019.

In terms of garden land, the garden area accounted for 10.76% of the agricultural land area in 2010 and 10% of the agricultural land area in 2018. From 2010 to 2018, the garden area showed a downward trend, with the proportion of agricultural land decreased by 0.76%, and the total area decreased by 415.17 hectares. In 2019, the garden area decreased to the lowest value, accounting for 9.55% of the agricultural land.

In terms of forest land, the area of forest land in Julu County accounted for 1.28% of the total land area in 2018, From 2010 to 2018, the area of forest land decreased by 4.21%. The utilization situation is relatively stable, but it is still declining. By 2019, all villages and towns showed an upward trend. From the above data, it can be seen that the overall forest land in Julu County showed a downward trend from 2010 to 2018, but the woodland area of Julu County increased significantly by 2019, which was related to the identification of land types.

![Figure 1. change trend of agricultural land area in Julu County (2010-2019) (unit: hectare).](image)

3.2. **dynamic analysis of development and protection of construction land**

Construction land mainly includes commercial service land, industrial and mining land, residential land, public management and public service land, special land, transportation land and hydraulic construction land. From 2010 to 2018, the area of urban and rural construction land continued to rise, and the area increased by 679.15 hectares in 2018, but the proportion of construction land decreased from 87.7% to 85.22%, and the urban and rural construction land accounts for 86.59% of construction land in 2019. The results show that the growth rate of urban and rural construction land in Julu County is less than that of construction land.

The area of traffic land increased by 64.84% and 335.43 hectares, accounting for 8.61% of construction land from 6.45%. Transportation land is on the rise. In recent years, Julu County has vigorously increased transportation land to support the development of transportation service industry.
3.3. Dynamic analysis of development and protection of unused land

The unused land includes marshland, bare land, saline alkali land, sandy land and other grassland. The area of unused land decreased from 2010 to 2019, with the largest area in 2010. The area of unused land decreased to 1.32% of the total area in 2019, and the proportion decreased by 4.31%.

4. Coupling analysis of land space development and protection and economic and social development

In order to ensure the high-quality development of economy and society, scientifically establish and reasonably determine the key indicators of land and space development and protection, accurately implement the bottom line management indicators, combine the positioning and objectives of development and protection with the actual situation, and combine the economic data of social development and land use situation to conduct coupling analysis.

According to the statistical data of relevant departments, the social and economic data and land use data of Julu County from 2010 to 2017 are combined for correlation analysis to quantitatively analyze the relationship between social and economic development and land space development and utilization.

4.1. Overall analysis

According to the total resident population, total social output, regional total output value and land use type, agricultural land, construction land and unused land area, the paper comprehensively analyzes the land space development and protection and economic and social development by using correlation analysis method. Among them, the relationship between the area of various types of land and the level of macroeconomic development, from the total number of permanent residents in Julu County, there is no relationship between population change and land use change, and land use change will not affect the living conditions of permanent residents. From the perspective of GDP and total output, both of them are related to woodland, garden land, grassland, water area and water conservancy facilities land.
urban village, industrial and mining land, transportation land, and are negatively correlated with the first four land types, and positively correlated with urban village industrial and mining land and construction land, This result indicating that the importance of agricultural income in economic development is becoming weaker and weaker. According to the types of agriculture, construction and unused land, the scientific and reasonable adjustment of construction land will stimulate the further development of economy and society.

| Table 1. Correlation analysis of comprehensive economic indicators and land use. |
|-----------------------------------------------|
| Total sown area of crops (MU) | Cultivated land | Garden plot | Wood land | Grassland | Urban village and industrial land | Land for transportation |
| GDP Pearson correlation | 0.101 | -0.671 | .940** | .825 | .979** | .992** | .869* |
| Total output Pearson correlation | 0.433 | -0.671 | .878** | .893* | .981** | .954** | .835* |
| Total resident population Pearson correlation | 0.61 | -0.01 | -0.047 | 0.021 | -0.042 | 0.056 | 0.185 |
| | Land for water area and water conservancy facilities | Other land | Agricultural land | Land used for building | Other land use |
| GDP Pearson correlation | -.911** | -0.433 | -.962** | .966** | -.909** |
| Total output Pearson correlation | -.851* | -0.337 | -.925** | .928** | -.848* |
| Total resident population Pearson correlation | -0.009 | 0.013 | -0.015 | 0.081 | -0.01 |

*There was significant correlation at 0.05 level (bilateral).
**01 (bilateral).

4.2. coupling analysis of industrial structure and land space development and utilization

There is still room for optimization of the three industrial structures in Julu County. From the perspective of the primary, secondary and tertiary industries, economic and social development has increased the demand for agricultural land and construction land, resulting in the continuous consumption of ecological function land. The contradiction between the ecological environment requirements of the future urban development orientation and the current ecological environment situation makes the task of land ecological environment construction and protection more arduous. Comrade Xi Jinping proposed that "green waters and green mountains are golden mountains and silver mountains". In order to ensure the stable economic development of Julu County for a long time, the rational and efficient development, utilization and protection of land and resources are also facing great challenges.
Table 2. Correlation analysis between total output of primary, secondary and tertiary industries and land use.

|                                   | Cultivated land | Garden plot | Woodland | Grassland | Urban village and mining land | Land for transportation |
|-----------------------------------|-----------------|-------------|----------|-----------|-------------------------------|------------------------|
| Primary industry                  | Pearson correlation | -0.693     | -.904**  | -.786*   | -.971**                       | 979**                  | 864*                   |
| The secondary industry            | Pearson correlation | -0.567     | -.772*   | -.933**  | -.918**                       | 850*                   | 0.71                   |
| The service sector; the tertiary industry | Pearson correlation | -.755*     | -.932**  | -.776*   | -.968**                       | 993**                  | 934**                  |

|                                   | Land for water area and water conservancy facilities | Other land | Agricultural land | Land used for building | Other land use |
|-----------------------------------|-----------------------------------------------------|------------|-------------------|------------------------|---------------|
| Primary industry                  | Pearson correlation                                  | -.887**    | -0.397            | -.952**                | 955**         | -.883**     |
| The secondary industry            | Pearson correlation                                  | -0.752     | -0.279            | -.809*                 | 812*          | -0.749      |
| The service sector; the tertiary industry | Pearson correlation                                  | -.887**    | -0.343            | -.992**                | 994**         | -0.884**    |

**01 (bilateral).

*There was significant correlation at 0.05 level (bilateral).

In the correlation analysis between the total output of the primary, secondary and tertiary industries and land use, from the correlation analysis of agricultural land, construction land and other land and various industries, agricultural land and other industries are negatively correlated, while construction land is on the contrary, positively correlated with economic indicators, indicating that the rational layout of urban space can promote economic development.

4.3. coupling analysis of agricultural development and land space development and utilization

Combining the output value of the primary industry in Julu County from 2010 to 2017 with the area of agricultural related land, the correlation analysis is conducted. According to the correlation analysis of the subdivision industries of the primary industry and the area of agricultural related land, the irrigated land, scenic spots and special land have a positive correlation with the output value of the primary industry. There is a positive correlation between agriculture, forestry, animal husbandry and fishery and agricultural output value. Agriculture, forestry, animal husbandry and fishery service industry is also positively correlated with scenic spots and special land use. Facility agricultural land is positively related to agricultural industry except fishery, which indicates that the development of industry can not be separated from the support of facility agricultural land. The steady development of irrigated land area and the reasonable increase of scenic land are conducive to the further improvement of agricultural industry.

Other types of agricultural land use are negatively correlated with the economic development level of the primary industry, which indicates that maintaining the existing land area is a key consideration for the spatial development and protection of Julu County, and the focus on expanding the agricultural land area can not expand the agricultural production results.
In the correlation analysis of industry segmentation and land use, with the development of industries under scale, wholesale and retail industry, accommodation and catering industry, financial industry, leasing and business service industry and public management and social organizations, it puts forward more demands for the use of urban and rural land, industrial and mining land and transportation land, showing a significant positive correlation. Industry, manufacturing industry, construction industry, software industry and scientific research, technical service and geological survey industry have great influence on construction land. The development of industry will stimulate the full use of construction land.

**Table 3. Correlation analysis of total output value of primary industry and agricultural land**

|                        | Cultivated land | Irrigate the land | Dry land | Garden plot | Orchard | Other gardens | Woodland |
|------------------------|-----------------|-------------------|----------|-------------|---------|---------------|----------|
| Agriculture, forestry, animal husbandry and fishery | -0.694 | .789* | -0.850* | -0.905** | -0.927** | -0.870* | -0.786* |
| Agriculture           | -0.651 | .800* | -0.855* | -0.890** | -0.908** | -0.859* | -0.754* |
| Forestry              | -0.760* | 0.628 | -0.701 | -0.791* | -0.817* | -0.753 | -0.796* |
| Agriculture, forestry, animal husbandry and Fishery Services | -0.838* | 0.643 | -0.726 | -0.845* | -0.885** | -0.794* | -0.721 |

|                        | Other woodlands | Grassland | Other grasslands | Scenic spots and special land | Rural roads | Pond water surface | Ditch | Facility farmland |
|------------------------|-----------------|-----------|------------------|-----------------------------|-------------|-------------------|-------|------------------|
| Agriculture, forestry, animal husbandry and fishery | 0.632 | -.971** | -.971** | 0.857* | -0.356* | -0.985** | -0.916** | 0.873* |
| Agriculture           | 0.578 | -.949** | -.949** | 0.828* | -0.372* | -0.990** | -0.907** | 0.829* |
| Forestry              | 0.692 | -.931** | -.931** | 0.746 | -0.018* | -0.877** | -0.802* | 0.952** |
| Animal Husbandry      | 0.755* | -0.645 | -0.645 | 0.66 | -0.071* | -0.43 | -0.514 | 0.772* |
| Agriculture, forestry, animal husbandry and Fishery Services | 0.804* | -0.918** | -0.918** | 0.882** | -0.226* | -0.870* | -0.845* | 0.955** |

**01 (bilateral).**

*There was significant correlation at 0.05 level (bilateral).*

4.4. **coupling analysis of secondary and tertiary industries and land space development and utilization**

In the correlation analysis of industry segmentation and land use, with the development of industries under scale, wholesale and retail industry, accommodation and catering industry, financial industry, leasing and business service industry and public management and social organizations, it puts forward more demands for the use of urban and rural land, industrial and mining land and transportation land, showing a significant positive correlation. Industry, manufacturing industry, construction industry, software industry and scientific research, technical service and geological survey industry have great influence on construction land. The development of industry will stimulate the full use of construction land.
land. Accordingly, most of the above industries have obvious negative correlation with cultivated land area, garden area, woodland area and grassland area, which reflects the occupation of land by the vast majority of modern industries, and further highlights the contradiction between the land demand of various industries and the demand of traditional agricultural land.

### Table 4. Analysis of the correlation between the gross production value of the primary, secondary and tertiary industries and land use

|                      | Cultivated land | Garden plot | Wood land | Grassland | Urban village and industrial and mining land | Land for transportation |
|----------------------|-----------------|-------------|-----------|-----------|---------------------------------------------|------------------------|
| **GDP**              | Pearson correlation | -0.671      | -0.940**  | -0.825*   | -0.979**                                    | 0.992**                | 0.869*                 |
| **Primary industry** | Pearson correlation | -0.701      | -0.921**  | -0.778*   | -0.968**                                    | 0.989**                | 0.879**                |
| **The secondary industry** | Pearson correlation | -0.055      | -0.696    | -0.898*   | -0.731                                      | 0.649                  | 0.315                  |
| **The service sector; the tertiary industry** | Pearson correlation | -0.75       | -0.934**  | -0.767*   | -0.962**                                    | 0.993**                | 0.931**                |

|                      | Land for water area and water conservancy facilities | Other land | Agricultural land | Land used for building | Other land use |
|----------------------|--------------------------------------------------------|------------|-------------------|------------------------|---------------|
| **GDP**              | Pearson correlation | -0.911**    | -0.433            | -0.962**               | 0.966**       | 0.909**      |
| **Primary industry** | Pearson correlation | -0.896**    | -0.408            | -0.965**               | 0.968**       | 0.893**      |
| **The secondary industry** | Pearson correlation | -0.718      | -0.629            | -0.509                 | 0.523         | -0.719       |
| **The service sector; the tertiary industry** | Pearson correlation | -0.889**    | -0.355            | -0.991**               | 0.993**       | 0.886**      |

*There was significant correlation at 0.05 level (bilateral).
**01 (bilateral).

5. Conclusion and Prospect

"Green waters and green mountains are golden mountains and silver mountains". Land is the material basis of economic and social development. The traditional extensive economic growth, which emphasizes increment, scale and expansion, leads to overdraft of natural resources, unbearable burden of environment and shortage of high-quality ecological products, which has become the short board of national development. To promote high-quality development, we must speed up the transformation of the development mode, and then speed up the transformation of the mode of land development and space protection. High quality development is not only green, low-carbon and sustainable development, but also efficient, dynamic and competitive development. High quality development depends on the spatial support of high-quality land.
According to the correlation analysis between the GDP of the primary, secondary and tertiary industries and the area occupied by land use types from 2010 to 2017, it can be seen that the area of urban village, industrial and mining land, transportation land and GDP of the primary and secondary industries are positively correlated. The reasonable expansion of the two types of land can support economic development to a certain extent, and the area of arable land has nothing to do with each gross product. In order to protect the land space and stick to the red line of cultivated land, the cultivated land area can not be reduced without limit. The area of woodland is negatively correlated with GDP, while that of garden land, woodland, grassland, water area and water conservancy facilities is negatively correlated with the primary and secondary industries. The growth of area has no positive impact on the economy.

According to the correlation analysis results of the secondary industry subdivision industry and the relevant application area, it can be clear that the industrial output value above the scale is positively correlated with the construction towns, villages, mining and various traffic land. The development of the secondary industry cannot be separated from the development of production and transportation land. Production and transportation land are the basis and support of industrial production. Scientific and reasonable transportation land can greatly promote social and economic development.

The red line of cultivated land should be ensured and the economy of the primary industry should be sustained and stable. In terms of agricultural land and construction land, efficient and reasonable development of land space can promote the further development of the tertiary industry economy in Julu County. We should restrict the use of land for the secondary industry, vigorously supervise the production links of industrial industries, maintain the ecological environment and promote economic construction simultaneously, and build a society of "innovation, coordination, green, open and sharing", so as to ensure the healthy development of the society.

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