Study on the Influencing Factors of Agricultural Development in Qinghai Province

Jiaxing Liu¹, Rongnan Chen¹, Rui Han², Laisheng Chen²*

¹Qinghai University, Xining City, Qinghai Province, China
²Qinghai Key Laboratory of Vegetable Genetics and Physiology, Academy of Agriculture and Forestry Sciences, Qinghai University, Xining 810016, China

*Corresponding author's e-mail: hanrui11473@163.com (Rui Han); chenls64@163.com (Laisheng Chen)

Abstract. The level of agricultural economic development in Qinghai Province is directly related to the economic development, social stability, and national unity of Qinghai Province. It has an extremely important position, so studying the influencing factors of agricultural development can improve the level of agricultural development in Qinghai Province. This paper extracts seven indicators from four dimensions: production equipment, capital input, labor, and main input for multiple linear regression analysis. This paper analyzes that the total power of agricultural machinery, the proportion of peasant population at the end of the year, and the number of large livestock stocks at the end of the year have a negative correlation with agricultural development in Qinghai. The total investment in fixed assets in agriculture, rural employees, total planted area of crops, and the area of closed mountain (sand) forest at the end of the year presented positive correlations to the agricultural development of Qinghai Province. And the conclusion shows that the influencing factors of agricultural development in Qinghai Province are not only these seven main factors, but also other small aspects that need to be considered.

1. Introduction

Over the past 40 years of reform and opening up, Qinghai Province has persisted in its unwavering position as the “agriculture, rural areas and farmers”, persisted in the development of characteristic industries, and persisted in protecting the enthusiasm of farmers and herdsmen. Today, the total agricultural production accounts for 9.34% of Qinghai’s regional GDP, higher than the national share of 6.83%, which is the basis of Qinghai's national economy; and the agricultural population accounts for more than 47.91% of the total population of the province, higher than 40.41% Of national share. The level of agricultural economic development in Qinghai Province and the income status of the rural population are directly related to Qinghai's economic development, social stability and national unity, so it is extremely important to study agricultural development[1]. At the same time, according to the natural conditions and socio-economic development of the Qinghai-Tibet Plateau, agriculture will continue to be a basic industry in Qinghai for a long time, an important foundation for realizing the socio-economic development of Qinghai and the life of farmers and herdsmen [2]. Therefore, it is of great practical significance to study the agricultural development of Qinghai Province, and studying the influencing factors of agricultural development of Qinghai Province can benefit and avoid the disadvantages, thereby improving the agricultural development level of Qinghai Province.
2. Empirical analysis

2.1 Index selection

In the analysis of the factors affecting the development of agricultural economy in Qinghai Province, this paper selects seven influencing factors from four dimensions: production equipment, capital input, labour, and main input. In terms of production equipment, the index of total power of agricultural machinery (10,000 kilowatts) is used to indicate how much power is used by the agricultural industry. In terms of capital investment, the total investment in fixed assets (100 million Yuan) in agriculture represents the largest amount of funds required in the agricultural industry. In terms of labour, we selected two indicators of the proportion of the peasant population (%) and rural employees (10,000 people) at the end of the year to explain the impact of urbanization and rural employment on agricultural development; Forest and animal husbandry selected crops (thousand hectares), year-end closed mountain (sand) afforestation area (thousand hectares) and large livestock stocks at the end of the year (thousands). The indicator for measuring agricultural development is the total agricultural output value, so the dependent variable of agricultural development is selected as the total agricultural output value.

2.2 Data sources

All data in this article are from the National Statistical Yearbook and the Statistical Yearbook of Qinghai Province. Due to Qinghai Province's efforts to solve the "three rural issues" in 2003, preliminary progress has been made in the field of agriculture; official annual data for 2019 have not yet been released, so data from 2003-2018 were selected. In order to facilitate the analysis and statistics, the total power of agricultural machinery (ten thousand kilowatts) is assumed to be $X_1$, the total investment in fixed assets (100 million Yuan) of agricultural society is $X_2$, the proportion of farmers at the end of the year (%) is $X_3$, and the rural employment (10,000 people) is $X_4$. The total sown area of crops (thousand hectares) is $X_5$. At the end of the year, the area of closed forests (sand) for afforestation (thousand hectares) is $X_6$. The number of large livestock at the end of the year (ten thousand) is $X_7$. The regression model established is

$$ y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e $$

The specific data is shown in Table 1:

| Year | Y     | X1   | X2   | X3   | X4   | X5   | X6   | X7   |
|------|-------|------|------|------|------|------|------|------|
| 2003 | 76.95 | 292.43 | 16.44 | 0.618209 | 180.55 | 466.8 | 415.7 | 455.9 |}
| 2004 | 86.65 | 325.76 | 14.81 | 0.614723 | 184.55 | 473.7 | 417.6 | 452.8 |}
| 2005 | 94.04 | 327.34 | 12.61 | 0.607493 | 186.04 | 476.73 | 457.22 | 453.5 |
| 2006 | 97.63 | 335.07 | 19.69 | 0.607979 | 185.34 | 512.2 | 425.24 | 486.1 |
| 2007 | 121.25 | 348.56 | 25.2 | 0.599311 | 189.35 | 516.7 | 555.3 | 487.9 |
| 2008 | 153.4 | 355.68 | 31.52 | 0.591395 | 193.74 | 613.63 | 579.2 | 484.2 |
| 2009 | 157.3 | 388.68 | 53.81 | 0.580998 | 195.51 | 514.06 | 687.4 | 480.7 |
| 2010 | 201.32 | 421.31 | 76.4 | 0.552807 | 198.34 | 526.75 | 771.5 | 471.6 |
| 2011 | 230.82 | 430.69 | 84.99 | 0.537779 | 203.01 | 540.05 | 887.5 | 478.8 |
| 2012 | 263.86 | 434.99 | 74.54 | 0.525586 | 203.14 | 554.21 | 989.8 | 459 |
| 2013 | 310.3 | 410.58 | 98.46 | 0.514876 | 202.8 | 555.77 | 1096.8 | 484.7 |
| 2014 | 327.49 | 440.9 | 128.13 | 0.502245 | 206.8 | 553.7 | 970.8 | 484.7 |
| 2015 | 319.27 | 453.87 | 143.34 | 0.480006 | 208.1 | 558.39 | 1152.9 | 485.5 |
| 2016 | 338.8 | 458.56 | 147.51 | 0.483706 | 208 | 561.33 | 1362.3 | 614.2 |
| 2017 | 364.1 | 462.35 | 127.98 | 0.469334 | 210.4 | 558.58 | 1451 | 575.1 |
| 2018 | 405.93 | 472.08 | 143.98 | 0.455316 | 209.7 | 557.25 | 1479.3 | 527.6 |

Data source: National Bureau of Statistics and Qinghai Province Bureau of Statistics
2.3 Multiple linear regression models

The data in Table 1 are analyzed by SPSS. The statistical results show that all independent variables are considered within the range, and they collectively affect and determine the dependent variable. Then continue to check the model fit. As can be seen from the model summary in Table 2, the correlation coefficient $R$ is 0.995, the determination coefficient $R^2$ is 0.991, and the adjusted $R$ square is 0.987, which is close to 1, indicating that the goodness of fit is good. The relevant results are shown in Table 2.

| model | R  | R side | Adjusted R-squared | Standard estimation error |
|-------|----|--------|--------------------|--------------------------|
| 1     | 0.995 | 0.990 | 0.981             | 15.32834905             |

Table data source: SPSS software data analysis

Then perform the variance test. From Table 3, for a given significant level $\alpha = 0.05$, the critical value of $F$ is $F_{\alpha}(k, n-k-1) = F_{0.05}(7, 8)$, $F = 113.499 > F_{0.05}(7, 8) = 3.44$, so rejecting the null hypothesis, the linear relationship between the variables is significant.

| Model | squared sum | df | mean square | F     | Sig.   |
|-------|-------------|----|-------------|-------|--------|
| 1     | return      | 186672.300 | 7 | 26667.471 | 113.499 | .000b  |
| Residual | 1879.666 | 8 | 234.958     |       |        |
| total | 188551.966 | 15 |             |       |        |

Table data source: SPSS software data analysis

Secondly, according to the regression data in Table 4, a regression equation is constructed by using regression coefficients.

| model | Unstandardized coefficient | Normalization coefficient | Saliency |
|-------|----------------------------|---------------------------|----------|
|       | B             | Standard error | Beta | t |         |
| 1     | 486.438        | 803.272       | 0.606 | 0.562 |
| x1    | -0.468         | 0.477         | -0.244 | -0.981 | 0.355 |
| x2    | 0.153          | 0.550         | 0.080 | 0.278 | 0.788 |
| x3    | -1302.822      | 919.614       | -0.667 | -1.417 | 0.194 |
| x4    | 2.764          | 4.089         | 0.249 | 0.676 | 0.518 |
| x5    | 0.156          | 0.209         | 0.054 | 0.746 | 0.477 |
| x6    | 0.77           | 0.100         | 0.256 | 0.763 | 0.467 |
| X7    | -0.150         | 0.211         | -0.059 | -0.710 | 0.498 |

Data source: SPSS analysis

From Table 4, the regression equation can be obtained as:

$$y = 486.438 - 0.468x1 + 0.153x2 - 1302.822x3 + 2.764x4 + 0.156x5 + 0.77x6 - 0.150x7 + \varepsilon(2)$$
Finally, a statistical test of the model is performed. First, through the fitness test: 
\[ R^2 = 0.990 \], which is close to 1, indicating that the model has a good linear fit. The second is the F test: from the statistical results in Table 3, the F value is significantly greater than the significant level, so the null hypothesis can be rejected, indicating that the overall regression is significant.

2.4 Results analysis

2.4.1 Factors affecting production equipment. In the evaluation of the influencing factors of agricultural development in Qinghai Province, the impact of production equipment represented by the total power of each unit of agricultural machinery on agricultural development in Qinghai Province was -0.468. This is because the total power of agricultural machinery is the sum of the power of various types of agricultural machinery. Although agricultural machinery and equipment can improve the efficiency of agricultural production, today agricultural machinery in Qinghai Province still wastes water and electricity resources. Problems such as inadequate management systems for machinery, especially the low utilization of new energy and new technologies in agricultural machinery. Therefore, there is a small negative impact after the positive and negative impacts on agricultural development are offset. In 2018, the power of Qinghai Province’s diesel engines was 445 trillion higher than that of electric motors, which was 11.46 times that of electric motors. However, diesel engines have problems such as high energy consumption, waste, and high costs, which will increase the cost of agricultural development and reduce productivity.

2.4.2 Influencing factors on capital investment. In terms of capital investment for agricultural development, this article selects the capital invested with the largest fixed assets. However, it can be seen that increasing the input of fixed assets per unit can increase agricultural output by 0.153 units. This is due to the uneven distribution of capital investment in fixed assets. According to the 2018 statistical yearbook data of Qinghai Province, it can be seen that the fixed assets of the agricultural industry have increased by 12.5 percentage points compared with the previous year, but the agricultural industry, animal husbandry industry, and fishery industry have each decreased by 6.1, 18, and 67.9 Percentage points, an increase of 52.8 percentage points in the forestry industry. However, in the agricultural industry of Qinghai Province, the output value of agriculture, animal husbandry, and fishery industries were 16.923 billion Yuan, 21.598 billion Yuan, and 364 million Yuan, accounting for 95.79% of the total agricultural output value of the year, while forestry accounted for 2.56%. In 2018, increasing fixed investment in forestry and reducing fixed investment in other industries will not increase the output of all agricultural development. At the same time, in 2018, the completion rate of agricultural projects above 5 million Yuan was 21.8%, far lower than 76.64% in Gansu Province. The low completion rate of fixed assets also reduced the advantages of fixed asset investment.

2.4.3 Influencing factors on labor force. In terms of labour force factors for agricultural development, two indicators, the proportion of the peasant population and the agricultural employment population, selected at the end of this year. It can be seen that increasing the proportion of the peasant population and agricultural employment at the end of each unit can reduce 1302.822 and increase the agricultural output value by 2.764. This is because the proportion of the peasant population at the end of the year represents the level of non-urbanization. At present, the rural population entering the city can increase income and improve the knowledge level of the rural population. The advantages outweigh the disadvantages. In contrast, the rural population left behind has less information received in rural areas, and has little room for improvement in agricultural development. Today, Qinghai Province has a small agricultural employment population. The increase in agricultural employment population can ensure that land is planted and sheep are fed. At the same time, an increase in quantity can bring about a quality increase. The enhancement of labour quality also enhances the quality of agricultural development.
2.4.4 Influencing factors of factor input. There are various factors in the input of agricultural development, but the most critical and basic are the agricultural planting area, the number of large livestock at the end of the year in animal husbandry, and the forestry planting area. Increasing the agricultural planting area, the number of large livestock stocks, and the forest area per unit can increase the agricultural output by 0.156 units, 0.77 units, and reduce the agricultural output by 0.150 units. This is because for the time being, Qinghai Province has kept too much investment in agricultural factors, which is relatively slow compared with the increase in agricultural output. At the same time, the quality of agricultural factors is also slightly lower.

3. Suggestions on Promoting Agricultural Development in Qinghai Province

3.1 Improve the operating efficiency of production equipment
The production equipment in Qinghai Province's agricultural development is mainly composed of various machinery and equipment, including agricultural irrigation and drainage machines, harvesters, film laminators, transport vehicles, etc. These machinery and equipment involve multiple fields such as cultivation, breeding, and production. The use of these machinery and equipment can reduce human resources for agricultural development, reduce the inferior rate of agricultural development, and improve agricultural production efficiency. It is possible to improve the operating efficiency of agricultural production equipment by increasing the power of electric motors, using new technologies, and reusing machinery and equipment to reduce disadvantages and maximize advantages.

3.2 Improve the efficiency of capital investment
Investment in fixed assets mainly exists in the areas of construction and installation engineering, purchase of equipment, tools, and appliances. Investment in agricultural fixed assets is the material basis of agricultural production, it is necessary for agricultural development, and it is also a guarantee of welfare for farmers. Therefore, increasing capital investment can improve the level of agricultural development. However, in the process of increasing capital investment, we must focus on improving the efficiency of agricultural capital investment, and accelerate the efficiency of agricultural capital investment by increasing the distribution of agricultural capital input, the length of agricultural capital input, and the path of agricultural capital input.

3.3 Strengthen the quality of agricultural labor
The essence of both urbanization and increasing the agricultural population is to enhance the quality of agricultural labour, thereby reducing the rate of agricultural waste, avoiding agricultural risks, and improving agricultural development. To strengthen the quality of agricultural labour force, it is necessary to improve the knowledge level, anti-risk ability, and physical fitness of the agricultural labour force. At the same time, the welfare of agricultural labour force, such as education level, medical level, and infrastructure construction, must be enhanced to provide a more favourable environment can create high-quality agricultural labour, attract high-quality agricultural labour, and retain high-quality agricultural labour.

3.4 Improve the efficiency of agricultural input
The ecological environment and agricultural development in Qinghai Province are in a mutually beneficial symbiotic situation, so we must pay attention to the ecological environment while improving agricultural development. The input of agricultural elements is closely related to the ecological environment. Too much or too little input of agricultural elements or irregular farming of agriculture, deforestation and free-range animal husbandry will destroy the ecological environment and reduce the level of agricultural development. Therefore, improving agricultural input efficiency and paying attention to the ecological environment can improve agricultural production.
4. Conclusion
As the basic industry of Qinghai Province, the development of agricultural industry is very important, and its influencing factors are many and complex. Although this paper divides the main influencing factors of agricultural development in Qinghai Province into four dimensions and seven indicators, it can’t fully cover all aspects, such as agricultural insurance in financial support, temperature difference and humidity in meteorology and other factors affecting the agricultural development in Qinghai Province. Therefore, in order to promote the agricultural development of Qinghai Province by improving the influencing factors, it is necessary to take other small influencing factors into account on the basis of the four dimensions and seven influencing factors provided in this paper, and finally enhance the development of Qinghai Province and meet the needs of residents.

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