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IDE DISCUSSION PAPER No. 788

**Analysis of Scale Operation in  
Chinese Agricultural Process:  
Japan's Experience and Enlightenment**

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**Abstract:** The paper analyzes the change of the quantity of farms, the quantity of farmers, farmland scale and agricultural policy in china. It shows that the quantity of farms and farmers have experienced a process from rapid decrease to slowly declining. One of the most important operation forms in agriculture is family farm and family farmer. The paper shows that due to the Chinese agricultural labor force aging and governmental positive policies of scale operation, the process of large-scale agriculture could be accelerated. Comparing costs and benefits of retails, large grain producers and agricultural cooperatives in planting grain, this paper find that moderate scale operation in agricultural have incomparable advantage than retails and it is good for making up for the lack of labor force and increase agricultural income. Finally, according to the experience from Japan, measures of cultivating new type of agricultural management main body and strengthening the construction of farmer cooperatives and industry associations should be taken to promote agricultural modernization, thus meet the needs of the development of agricultural scale operation.

**Key words:** Moderate scale operations; Land transfer; Family farms; Japan's Experience

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### **Abstract**

The paper analyzes the change of the quantity of farms, the quantity of farmers, farmland scale and agricultural policy in china. It shows that the quantity of farms and farmers have experienced a process from rapid decrease to slowly declining. One of the most important operation forms in agriculture is family farm and family farmer. The paper shows that due to the Chinese agricultural labor force aging and governmental positive policies of scale operation, the process of large-scale agriculture could be accelerated. Comparing costs and benefits of retails, large grain producers and agricultural cooperatives in planting grain, this paper find that moderate scale operation in agricultural have incomparable advantage than retails and it is good for making up for the lack of labor force and increase agricultural income. Finally, according to the experience from Japan, measures of cultivating new type of agricultural management main body and strengthening the construction of farmer cooperatives and industry associations should be taken to promote agricultural modernization, thus meet the needs of the development of agricultural scale operation.

**Key words:** Moderate scale operations; Land transfer; Family farms; Japan's Experience

## 1. Background (Why do we need agricultural scale operation)?

Since Chinese government pushed the household contract responsibility system in the late 1970s, farmers have been the most basic production units, and the enthusiasm and creativity of farmers have been motivated, and the great achievement of land reform has been achieved in China. In 2016, bumper crops were harvested again and the total output was 616.23 million tons, which was 520.10 million tons less than that in 2015. Although the momentum of continuous grain production growth since 2003 has stopped, the grain production in 2016 was still the second-highest level of history.

Due to the restriction of production factors, the agricultural production method, a great many problems of this kind of production method have appeared such as aging of agricultural labor force, land fragmentation, lower technology contribution rate and low income of farmers.

### 1.1. The current situation of rural population distribution and agricultural labor force

Table 1-1 China's population distribution in urban and rural areas from 1980 to 2016

Year	Urban		Rural	
	Population	Proportion(%)	Population	Proportion(%)
1980	19140	19.39	79901	80.61
1990	30195	26.41	84138	73.59
2000	45906	36.22	80837	63.78
2010	66978	49.95	67113	50.05
2011	69079	51.27	65656	48.73
2016	79298	57.35	58973	42.65

Data source: 《China Statistical Yearbook》 (1981-2017)

The urban-rural dual economic structures caused that a large number of population concentrated in the countryside. The urbanization strategy has been promoted since the reform and opening-up policy. China's urbanization rate broke 50% in 2011 and the employment rate of primary industry, secondary industry and tertiary industry was 27.7%, 28.8% and 43.5%, respectively in 2016. Rural labor force employed in

agriculture was lower than rural population, and the majority of the young adults worked as migrant workers in other industries, which cause the increasingly serious problem of aging and feminization of agricultural labor force.

The number of migrant workers reached 281.71 million in 2016, with an increase of 4.42 million than previous year. Migrant workers were mainly young people, but the proportion decreased, and the average age of migrant workers increased. In 2016, the average age of migrant workers was 39 years old, with an increase of 0.4 years than previous year. 53.9 percent of the migrant workers were under 40, with a decrease of 1.3%. 19.2 percent of the migrant workers were over 50, with an increase of 1.3%. The new generation of migrant workers who born in or after 1980 are becoming the main force and account for 49.7%, while the old generation of migrant workers account for 50.3%.

Table 1-2 Age composition of migrant workers (Unit:%)

	2012	2013	2014	2015	2016
16-20 years old	4.9	4.7	3.5	3.7	3.3
21-30 years old	31.9	30.8	30.2	29.2	28.6
31-40 years old	22.5	22.9	22.8	22.3	22.0
41-50 years old	25.6	26.4	26.4	26.9	27.0
Above 50 years old	15.1	15.2	17.1	17.9	19.2

Data source: 《China Statistical Yearbook》 (2013-2017)

In 2016, 1% of the migrant workers never obtained any education, the proportion of migrant workers who had primary school, junior high, senior high, and college or above education was 13.2%, 59.4%, 17% and 9.4%, respectively. Migrant workers who had senior high or above education accounted for 29.1% with an increase of 1.2 percent than previous year, while migrant workers who worked in local place account for 23.9% with an increase of 1.3 percent than previous year.

Table 1-3 The education level of Migrant workers

Total migrant workers	Migrant worker worked in other place	Migrant worker worked in local place
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	2015	2016	2015	2016	2015	2016
<b>No education</b>	1.1	1.0	0.8	0.7	1.4	1.3
<b>Primary school</b>	14.0	13.2	10.9	10.0	17.1	16.2
<b>Junior high school</b>	59.7	59.4	60.5	60.2	58.9	58.6
<b>Senior high school</b>	16.9	17.0	17.2	17.2	16.6	16.8
<b>College or above</b>	8.3	9.4	10.7	11.9	6.0	7.1

Data source: 《China Statistical Yearbook》

The average monthly income of migrant workers was 3275 Yuan, with an increase of 203 Yuan and a growth rate of 6.6%. The average monthly income of migrant workers who worked in local place was 2985 Yuan, with an increase of 204 Yuan and a growth rate of 7.3% than previous year. Average monthly income of migrant workers who worked in local place was 587 Yuan lower than migrant workers worked in other places; however, its growth speed was 1 percent faster.

The research group of ‘Chinese food safety development strategy’ in Research Center for Rural Economy has done a research which is based on the survey data of 1552 rice growers from 134 villages in 22 provinces (districts or cities) in 2011. The samples householders’ average age was 51.4 and 55.3% of them were over 50 years old. Their education attainment was 7 years and most of them only received junior school education. A report on the current situation of rural endowment problem in China in 2014 released by Shanghai University of Finance and Economics showed that 54.6% of the rural elderly were still engaged in work. According to the prediction of Huang Jikun and Jin Shaoze, the average age of agricultural labor force in China will reach about 55 or 56 in 2020. The problem of agricultural labor force aging would be accelerated in the next 10 years, and the average age of agricultural labor force in China will be close to Japan, whose average age is 66.3.

Table 1-4 population and average age of agricultural labor force in Japan

Year	Number of farmers (thousand households)	Average age (years old)	Number of sold farmers(thousand households)	Average age of sold farmers (years old)
2015	2155	66.4	1329	63.84 <sup>1</sup>
2010	2606	65.8	-	-
1990	3848		2971	-

Data source: Japan Statistical Yearbook, Japanese Ministry of Agriculture, Forestry and Fisheries, 2015

The number of agricultural labor in Japan has dropped since early 1960s. By 2015, there were 2155 thousands farmers in Japan, which was 44% less than that in 1990 with a decline of 2.2% per year. Farmers engaged in sales decreased from 2971 thousands in 1990 to 1329 thousands in 2015, with a decline over 55%. “Backbone farmers”, as the main force of farmers, were also decreased to 1786 thousands, with a decline of 13.8% in recent 5 years.

At the same time, the aging of agricultural labor force is becoming more and more serious. In 2015, the average age of agricultural labor force in Japan reached 66.4 years old, with an increase of 3 years than that in 2005. More than 56% of farmers engaged in the sales were over 64 years old, and nearly 40% of them are over 70 years old. In addition, concurrent operation of rural family in Japan are serious and the proportion of agricultural income in household income is becoming smaller and smaller.

## 1.2. The situation of land fragmentation

The large-scale transfer of cheap agricultural labor force from rural to urban areas successfully formalized labor intensive product with international competitiveness and comparative advantages and released demographic dividend, but had not completely separated farmers from land. In China, farmland bears the pressure of survival and security brought by large population, and the idea ‘equalization of landownership’ is

<sup>1</sup> The author estimates according to the data of more than 56 percent of the farmers in the market are over 64 years old and over 70 years old.

used to alleviate population pressure, which has directly caused serious land fragmentation.

There is always a large population but little land in China, with serious land fragmentation and small scale of farmers' operation. The scale of farmers' operation was shrinking during the last 200 years and it was 0.5 hectares in 2003, which was only 25% of that in 1830s. One of the main reasons is the huge increase in population since the founding of the People's Republic of China. The other reason is the traditional rural separation system in China.

Table 1-5 Comparison of the Status of Land Fragmentation in Different Time Periods in China

Year	Average land area	Average number of	Family business
(year)	(hm <sup>2</sup> )	plots (piece)	scale (hm <sup>2</sup> )
1929-1933 <sup>2</sup>	0.380	5.6	2.1
1984-1985	-	9.7	0.62
1999	0.087	6.1	0.53
2003	0.087	5.772	0.501

The data from the agriculture and Fisheries Ministry in 2015 in Japan showed the average scale of farmers' operation increased from 0.3 hectares to 2.5 hectares, which is as 5 times as the scale of China. But studies suggest 88% of farmers in Japan operated land under 2 hectares and the scale of 68% of farmers is less than 1 hectare, which is far away from most countries in Europe and America (Zhou, et al, 2015).

### 1.3. Low agricultural comparative advantage and slow income growth

Agriculture in China focuses on extensive style of economic growth for a long time. This kind of production method which only depends on production factors such as land and fertilizer is hard to continue, and it is more and more difficult to increase income and production.

#### (1) Agricultural production with high cost and low interest

The input of labor force in rice, wheat and corn production has steadily declined from 1978 to 2014 and there has been a big increase in mechanical input, fertilizer and other inputs. The work days per mu of three kinds of staple grains have declined from 33.31

<sup>2</sup> Data resource: PuKai's research data "China's farm economy" and "China's land use".

days in 1978 to 5.87 days in 2014, with a decrease of 82.4%. The cost of fertilizer per mu has increased from 7.8 Yuan in 1978 to 132.42 Yuan in 2014. The cost of pesticide per mu has increased from 0.84 Yuan in 1978 to 27.56 Yuan in 2014. The cost of mechanical work per mu has increased from 0.84 Yuan in 1978 to 134.08 Yuan in 2014.

Table 1-6 The cost of three kinds of staple grains cost

	Employee	Fertilizer cost	Pesticide cost	Machinery cost
	number(day/mu)	( Yuan/mu)	( Yuan/mu)	( Yuan/mu)
1978	33.31	7.08	0.84	0.84
2014	5.78	132.42	27.56	134.08

Data source: 《 National agricultural product cost-benefit data compilation,2015》

Due to the increase of agricultural capital price and labor wages in recent years, the profit margin of three kinds of staple grains production is getting lower and lower.

National agricultural product cost-benefit data compilation in 2015 showed that the total cost per mu of three staple grains has increased from 600.41 Yuan in 2009 to 1068.57 Yuan in 2014, with a growth rate of 77.97%. The labor cost per mu has increased from 188.39 Yuan in 2009 to 446.75 Yuan in 2014, with a growth rate of 137.14%. The land cost per mu has increased from 114.62 Yuan in 2009 to 203.94 Yuan in 2014, with a growth rate of 77.93%. The net profit per mu has dropped from 192.35 Yuan in 2009 to 124.78 Yuan in 2014, with a decrease rate of 35.13%. The profit ratio per mu has dropped from 32% in 2009 to 11.68% in 2014.

Table 1-7 Comparison of the cost and profit of three kinds of staple grains (unit: Yuan/mu)

	Total cost	Labor cost	Land cost	Net profit	Profit rate
2009	600.41	188.39	114.62	192.35	32%
2014	1068.57	446.75	203.94	124.78	11.68%
Increase rate	77.97%	137.14%	77.93%	-35.13%	-20.32%

Data source: 《 National agricultural product cost-benefit data compilation,2015》

(2)Urban-rural income gap narrows, but farmers' income increases slowly.

Per capita disposable income of countryside inhabitant in 2016 was 12363 Yuan, with a nominal growth of 8.2% and rose by 6% in real terms, remaining a stable growth trend. Per capita disposable income of urban inhabitant was 33616 Yuan, with a nominal growth of 7.8% and rose by 5.6% in real terms. Urban-rural income gap narrows. The income of rural inhabitants grew faster than that of urban inhabitants, and the income ratio between urban and rural residents dropped from 2.73 to 2.72 in the previous year. However, due to the influence of the low price of agricultural products and slow wage growth, the force that traditionally driven the growth of farmers' income is weakening. In 2016, farmers' income only increased by 6.2% and it has kept the downward tendency for 4 years. The growth rate of farmers' income was 0.5 percentages lower than that of GDP, which was the first decline since 2014.

## **2. The current situation of s agricultural cale operation**

With the large number of transfer of rural labor from rural areas to urban areas and from primary industry to secondary industry or tertiary industry, the proportion of human-land has been changed, which provide conditions for the development of moderate scale operation. It also helps reconstruct human-land relationship, improve resource allocation efficiency and facilitate expansion of domestic market and international competitiveness.

### **2.1.Agricultural operation factors are changing**

#### **(1)The scale of land transfer enlarged**

The land transfer was a small portion from the beginning of 1980s to the 1990s in China. According to the data of The National Rural Fixed Observation Point Survey, 93.8% of the farmers had never been involved in land transfer from 1984 to 1992, but land transfer accounted for 9.1% of the total arable land by 2003. In recent years, the speed of land transfer obviously accelerated. The household contract area of land transfer reached 403 million in 2014, which was as 2.16 times as that in 2010. The area of land transfer accounted for 30.32% of household contract area of land in 2014, which was 15.65% more than that in 2010.

#### **(2)Farmers' land operation scale increased**

The farmers' land operation scale increased when the scale of land transfer enlarged. By 2013, there were 226 million farmers whose land operation scale was under 10 mu, which accounted for 85.96% of the household contractors. The proportion of farmers whose land operation scale was between 10 to 30 mu and between 30 to 50 mu was 10.28% and 2.55%, respectively. By 2014, although most farmers' land operation scale was under 50 mu, the farmers whose land operation scale was over 50 mu increased

(3) The degree of mechanization of agriculture deepened.

The total powers of agriculture machine in China was 1.076 billion kw, which was as 9.16 times as that in 1978 or as 1.79 times as that in 2003. The power of large and medium-sized agricultural tractors increased from 32.3 million kw in 2003 to 144.37 million in 2012, which increased by 346.97%, while the power of small agricultural tractor only increased by 33.7% during that time. Rural electricity consumption rose by 158.78% from 343.3 billion kw in 2003 to 888.4 billion kw in 2014. However, the labor engaged in primary industry kept decreasing, which decreased from 326.04 million in 2003 to 227.90 million in 2014.

## **2.2.Agricultural businesses are becoming diversified**

In 2014, 58.31% of the transferred farmland was transferred to farmers, and 21.84%, 9.68% and 10.17% was transferred to professional cooperatives, enterprises and others entities, respectively. Compared with that in 2010, the farmland transferred to farmers and others entities decreased by 11.04% and 0.58%, respectively, while the farmland transferred to professional cooperatives and enterprises increased by 10.01% and 1.62%, respectively.

From the perspective of the overall pattern of land operation, the farmland operation is changing from single operation of farmers to joint operation of farmers, professional cooperatives and enterprises. Although farmers still occupy the dominant position, the scale and proportion of their farmland operation are all declining in recent years. From 2010 to 2014, the scale of farmers' cultivated land decreased by 4.44% from 12.15 billion acres to 11.61 billion acres, and the proportion of farmers' cultivated land declined by 8.08 percentages from 95.44% to 87.36%. In the same period, the scale and

proportion of farmland operated by professional cooperatives increased rapidly. The scale of farmland operated by professional cooperatives increased by 300% from 0.22 billion acres in 2010 to 0.88 billion acres in 2014. The proportion of farmland operated by professional cooperatives increased by .89 percentage from 1.73% in 2010 to 6.62% in 2014. During the same period, the farmland operated by enterprises and other entities also doubled.

### **3. Is the larger scale of agricultural operation better?-based on the survey in Anhui Province**

As mentioned above, China has formed many kinds of business entities such as small-scale farmers, large-scale farmers (family farms, also known as large grain farmers), agricultural cooperatives, agricultural leading enterprises. Under the current situation where the income of grain continues declining whether the new agricultural management entities effectively improve the utilization rate and output rate of land resources, reduce the cost of grain production, and increase the efficiency of grain production is the key to agricultural operation scale. This paper analyzes the current situation of the agricultural operation scale from the aspects of operating costs and operating efficiency based on the survey of retailers, large grain farmers and agricultural cooperatives who planted grains in Huan'an, Suqian and Xuzhou of Jiangsu Province.

#### **3.1. Cost and Benefit of agricultural operation**

The operating costs involved in the production of grain could be specifically divided into three parts: the costs of materials and services which including the spending of purchasing seed, fertilizers, pesticides, agricultural machinery and insurance, land costs, which including land transfer costs, and labor costs, which including employees spending.

As for self-employed farmers (referred to 'retails'), the grain production income after deduction of agricultural capital and other materialized labor could be regarded as labor remuneration or the benefit of growing grain. As for large scale operation, the grain production income after deduction of materialized labor, land rent and labor cost could be regarded as the benefit of growing grain. The benefit of growing grain can be divided into two parts: government subsidies including direct subsidies for grain,

subsidies for growing superior seed varieties, general subsidies for purchasing agricultural supplies and subsidies for purchasing agricultural machinery, and grain sale income including government purchase, direct sale and sale after processing.

### **3.2. Comparative analysis of grain production costs of retails, large grain farmers and agricultural cooperatives**

According to the survey data of Jiangsu Province, and taking traditional grain crops of rice and wheat as an example, this paper compares and analyzes the operating costs of retails, large grain farmers and agricultural cooperatives.

(1) The survey shows that material and service costs and labor costs are the main costs of retails. The highest planting cost is rice and reached at 1020 Yuan per mu in 2016, which is as 2.2 times as that of wheat. The labor cost account for up to 54% of rice production costs. Wheat production cost is 452 Yuan per mu in 2016, where labor costs only account for 32%.

(2) The survey shows that the costs of material and service and the costs of land rent are relatively high in the production costs of large grain farmers, which accounts for about 80% of total production costs. The labor costs are relatively low and accounts for about 20% of total production costs. In 2016, the average cost of rice and wheat was 1262 Yuan and 680 Yuan per mu, respectively.

(3) The structure of production costs of agricultural cooperatives is similar to that of large grain farmers. The costs of material and service and the costs of land rent are relatively high in the production costs of agricultural cooperatives, which accounts for about 80% of total production costs. The labor costs are relatively low and accounts for about 20% of total production costs. In 2016, the average cost of rice and wheat was 1238 Yuan and 690 Yuan per mu, respectively.

(4) Comparative analysis of production costs of retails, large grain farmers and agricultural cooperatives.

Firstly, there is no significant difference of material and service cost for planting wheat among farmers, large grain farmers and agricultural cooperatives. The material and service costs for planting rice of retails is lower than that of large grain farmers and agricultural cooperatives. In 2016, the material and service costs for planting



wheat of farmers, large grain farmers and agricultural cooperatives was 307 Yuan, 325 Yuan and 332 Yuan, respectively and the material and service costs for planting rice of farmers, large grain farmers and agricultural cooperatives was 450 Yuan, 480 Yuan and 460 Yuan, respectively. In order to ensure grain production, large grain farmers and agricultural cooperatives have higher costs of fertilizer, prevention and control, irrigation, transportation and mechanical harvesting. Therefore, cost of material and service of retails is lower than large grain farmers and agricultural cooperatives.

Secondly, the land costs of retails are zero (except for the opportunity cost). The costs of land rent of large grain farmers and agricultural cooperatives has increased significantly, which accounting for more than 50% of total costs. The survey data showed that the land costs of planting grain of large grain farmers and agricultural cooperatives was between 700 and 1000 Yuan per mu (Jiangsu is a two-crop-year system, and the rent cost is allocated to rice and wheat based on other cost ratios). Thirdly, large grain farmers and agricultural cooperatives have lower labor costs than retails. In the cost data, retail employment is also converted to cost. Large grain farmers and agricultural cooperatives have a relatively higher degree of mechanization, which is an important reason why large grain farmers and agricultural cooperatives have lower labor costs. In addition, it can be seen in previous analysis that the artificial cost of rice planting is higher than that of wheat and corn, which is also due to the relatively lower mechanization of rice planting and the higher number of employees.

Table 3-1 Cost of grain production (unit: Yuan)

Farmers category	Cost classification	wheat	rice
<b>Retails</b>	total input	452	1020
	material and service cost	307	450
	land cost	0	0
	labor cost	145	550
<b>Large grain farmers</b>	total input	680	1262
	material and service cost	325	480
	land cost	220	530
	labor cost	136	254

<b>Agricultural cooperatives</b>	total input	690	1238
	material and service cost	332	460
	land cost	220	530
	labor cost	138	248

Data source: Author

### 3.3. Analysis of grain revenue of retails, large grain farmers and agricultural cooperatives

(1) Survey data showed that the largest grain production revenue of retails is rice cultivation. In 2016, the grain production revenue of rice and wheat was 1794 Yuan and 860 Yuan per mu, respectively. The government provided subsidies as much as 180 Yuan per mu.

(2) In 2016, the grain production revenue of rice and wheat of large grain farmers was 1960 Yuan and 850 Yuan per mu, respectively. The government provided subsidies as much as 60 Yuan per mu.

(3) In 2016, the grain production revenue of rice and wheat of agricultural cooperatives was 1722 Yuan and 789 Yuan per mu, respectively. The government provided subsidies as much as 40 Yuan per mu.

(4) Comparative analysis of grain production revenue of retails, large grain farmers and agricultural cooperatives.

Firstly, regardless of retails or large grain farmers or agricultural cooperatives, their main grain production revenue is obtained by selling grain.

Secondly, there is no significant difference of grain production revenue among retails, large grain farmers and agricultural cooperatives. The retail samples of this survey are all familiar with grain production, have a high level of production technology and management, and have a good grain harvest. Thus, the revenue level of grain reflected on the survey data has overestimated the overall average level. However, it also shows that under the current grain production conditions, the grain production revenue of retails who are familiar with grain production is not lower or even higher than that of large grain farmers or agricultural cooperatives.

Table 3-2 Revenue of grain production (unit: Yuan)

<b>Farmers category</b>	<b>Cost classification</b>	<b>wheat</b>	<b>rice</b>
<b>Retails</b>	total revenue	860	1794
	government subsidies	180	
	sales revenue	860	
	others(straw by products, ect)	0	0
<b>Large grain farmers</b>	total revenue	850	1960
	government subsidies	60	
	sales revenue	819	1929
	others(straw by products, ect)	1	1
<b>Agricultural cooperatives</b>	total revenue	830	1743
	government subsidies	40	
	sales revenue	789	1722
	others(straw by products, ect)	1	1

Data source: Author

### 3.4. Comparative analysis of operating benefits (net revenue) of farmers with different scales

The survey showed that the main reason for high material costs of large grain farmers and agricultural cooperatives is that they highly rely on chemical fertilizers to pursue high grain production. Large-scale farmers have basically realized full-scale mechanized production. Large-scale famers have higher average rent per mu than retails, because higher mechanization can reduce labor time. However, owing to the fact that most of the rural young people go out to work, the existing labor force is in a serious shortage, resulting in the increasing wages of employees, and the labor cost increases year by year. In addition, the cost of land rent increases year by year, which become the biggest obstacles to scale operation, and resulting in the decreasing of net income of scale farmers.

### **3.5. Advantages of scale operation of grain production and income of agricultural socialization service**

According to the analysis of production costs and benefits, retails have advantage on grain production cost and higher net income than large grain farmers and agricultural cooperatives. However, large grain farmers and agricultural cooperatives have an incomparable advantage because of their large production scale. The survey shows that almost all of the large-scale farmers (more than 50 mu) and agricultural cooperatives own farm machinery. While they serve themselves, they could provide service for others retails at the same time. On the one hand, they make up for the shortage of labor force of retails. On the other hand, they increase their income. In addition, some large grain farmers and agricultural cooperatives can obtain the profit of processing and circulation. Due to the large scale of grain production, large-scale farmers can take their own advantages to get involved in sale and processing and establish integrated operation to form a “one-step” system of producing, processing and selling, thus, obtaining the profit of processing and circulation.

## **4. The problems of land transfer and scale operation**

### **4.1. Agricultural production costs rise and small farmers solidify**

In 1990-2014, the average output per mu of three kinds of grain (rice, wheat and corn) calculated at the present value increased by 13.6% annually, but the average cost per mu increased by 15.5%. The material and service costs increased by 12.2% annually, labor costs increased by 16.9% annually, and land cost increased as high as 24.6% annually (Luo, 2017), which indicates that China lacks land because land prices have risen faster and faster. The increase of output, import and inventory changing to the increase of material, labor and land costs show that the problems facing by China's agriculture do not emerge in the past two years, but the result of long-term accumulation.

On the one hand, in terms of cost structure, the proportion of material and service costs of three types of grain (rice, wheat, maize) decreased from 58.3% in 1990 to 39.1% in 2014, the proportion of labor costs rose from 35.1% in 1990 to 41.8% in 2014, and the

proportion of land costs rose from 6.6% in 1990 to 20% in 2014. From the perspective of growth rate, the cost of land rose fastest.

On the other hand, compared with the U.S., the average cost per mu or the cost of production per unit in China is much higher or even tripling than that in the United States.

Table 4-1 Comparison of the Costs of Rice, Wheat and Corn between China and the United States in 2014 (Unit: Yuan)

cost Breed	Cost per hectare			Cost per 50 kilos		
	China	U. S.	China higher than U. S. (%)	China	U. S.	China higher than U. S. (%)
Rice	16174.05	15451.20	4.68	127.27	86.15	47.73
Wheat	14476.95	4780.65	202.82	110.53	96.32	14.75
Corn	15958.35	10452.6	52.67	103.86	48.98	112.05

This kind of small-scale and fragmented management structure that makes the operating costs of farmers extremely high and there is basically no profit margin. It should be said that small-scale decentralized management is one of the important causes of the high cost of agriculture. However, a more serious dilemma faced by this pattern is the solidification phenomenon of small-scale operation.

Table 4-2 Distribution of farmers' land scale of operation (unit: %)

Scale of operation	The proportion of farmers in 1996	The proportion of farmers in 2014
Below 10 mu	76.00	85.90
10~30 mu	20.20	10.20
30~50 mu	2.30	2.60
More than 50 mu	1.50	1.30

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In 1996, the proportion of farmers whose land scale of operation was under 10 mu was 76%, and the proportion rose to 85.9% in 2014. In 1996, the proportion of farmers

whose land scale of operation was 10 to 30 mu was 20.2%, and the proportion declined to 10.2% in 2014. The proportion of farmers whose land scale of operation was 30 to 50 mu increased slightly, but the proportion of farmers whose land scale of operation was more than 50 mu decreased. Therefore, the pattern of small-scale farming in agriculture in our country does have a tendency of solidification.

#### **4.2. "non-food" phenomenon is becoming more and more serious after land transfer**

In recent years, the prices of land rents and agricultural means of production have rapidly risen, and the cost of grain production has been continuously rising, with a relatively lower benefit of grain production. Although governments provide subsidies for grain production, these subsidies are usually distributed to land contractors rather than land tenant. Even received subsidies, the economic benefits of producing food are far less than the benefits of planting "non-food" crops. Therefore, a considerable number of new business entities have opted for cash crops such as vegetables or fruits, which have a more and more obvious trend of "non-food" operation. As mentioned earlier, in the developed provinces of eastern China, the tendency of "non-food" becomes more evident after land transfer. From the perspective of current situation of agricultural production efficiency, food crop production has low comparative economic benefit, and farmers who transfer land need to bear the cost of renting the land. Therefore, the production and operation projects with higher economic benefits could be selected to realize the economic efficiency of land transfer. Therefore, "non-food" has become the basic motivation and trend of land transfer. According to the data released by the Ministry of Agriculture, the transfer of contracted farmland by the end of 2014 reached 403 million mu, with an increase of 18.3% than the previous year. The farmland which transfer to growing grains was 229 million mu, accounting for 56.8% of the total transferred farmland.

#### **4.3. The scale of agricultural operation is not the bigger the better**

According to the 2014 research results of the State Council's Economic Research Center, under the current conditions of agricultural production in our country, over-raising the scale of agricultural operations is not conducive to raising agricultural

yields. Farmers are divided into large-scale farmers and small-scale farmers according to the sown areas of land. Farmers with sown areas larger than the median of 7.96 mu are large-scale farmers. The results show that the yield of large-scale farmers is 714 Yuan per mu, which is much lower than the small-scale farmers with the yield of 2614 Yuan per mu. There are at least three reasons which could explain why large-scale farmers have lower agriculture yield. One reason is that the land scale of large-scale farmers is about 4 times more than that of small-scale farmers, while the labor input is only about 0.5 times more. The proportion of human-land of large-scale farmers is lower than that of small-scale farmers. The second reason is that the original value of large agricultural machinery is about 3 times more than that of small-scale farmers, which is not enough to completely compensate for labor input. The third reason is that the large-scale farmers mainly grow grain, with 78% of the sown area is used for food. However, small-scale farmers grow more cash crops, and the added value of cash crop is higher.

#### **4.4. Large-scale farmers have weak anti-risk ability and their earnings fluctuate significantly**

(1)Agricultural production infrastructure construction is insufficient and farmers' ability to withstand natural disasters is poor. One of the main reasons is that the rural traffic network is not matched. There are few tractor roads, which is not conducive to mechanical transport and operations. Second, poor drainage and irrigation facilities are vulnerable to natural disasters. The third reason is that the drying field is small and the storage condition is poor, which is easy to cause mildew when it cannot be sold in time, and is more likely to cause serious damage when it rains. The third reason is that the drying field is small and the storage condition is poor, it is easy to cause mildew when it cannot be sold in time, and it is more likely to cause serious damage when it rains. Some large grain farmers are unable or unwilling to invest in improving water conservancy facilities and purchasing large-scale agricultural machinery due to uncertain land leases, scattered lands and insufficient funds.

(2)The market competitiveness of food products is weak and the price risk is volatile. The first reason is that the premium of policy-oriented agricultural insurance is 10

Yuan per mu, and the maximum compensation is 320 Yuan per mu for wheat and 300 Yuan per mu for corn, respectively. If there is a serious disaster, the compensation will not even be sufficient to cover the land rent, which is a serious shock to the large grain farmers. The second reason is that although the grain market has been fully liberalized, prices have risen, sales have been smooth, and the phenomenon of backlogs is not easy to appear, the grain sale channels of most large grain farmers are purchased by individual operators, and there is phenomenon of different levels of price-cutting, and the market risks cannot be ignored. The third reason is that there are still some farmers who don't join any organizations and have weak anti-risk ability.

## **5. Experience and Policy Implications from Japan**

As the most economically developed country in East Asia, Japan is also one of the countries with the highest level of agricultural support and protection in the world. Under relatively unfavorable conditions of resource endowment, the Japanese government has comprehensively planned its own agricultural development and actively carried out agricultural policy reforms, in order to enhance the competitiveness of small-scale farmers. Compared with Japan, the scale of agricultural operations in China is even smaller, and the number of small-scale farmers is even greater. The pressure on agricultural development is greater and the problems faced are even more serious under the open market conditions, and it is very important to improve the competitiveness of small-scale farmers. In recent years, Japan's agricultural policy directions and related measures which used to improve the competitiveness of small-scale farmers could reflect its consideration of overcoming the limitations of small-scale farmers and improving agricultural competitiveness, which provide implications to China who is facing the similar problems.

### **5.1. Experiences of Japan's Agricultural Scale Operation**

(1) The development plan of agriculture, forestry and aquatic industry which released in the end of 2013 put forward the future development target of Japanese agriculture. One of the main goals is to achieve 1 trillion and 5 trillion yen of agricultural and aquatic products export in 2020 and 2030, respectively. At the same time, Japan set a target of market scale of 10 trillion yen for the six industrialization developments of its own



agriculture to cope with the shrinkage of traditional agricultural output value under open conditions. In addition, improving agricultural operation structure has been a key measure for Japan to cope with the agricultural problems such as domestic agricultural labor shortage and aging. Therefore, cultivating backbone business entities is also a major goal.

The goal of cultivating backbone business entities reflects Japan's efforts to promote the upgrading of small-scale farmers, as well as the training successors for agriculture, which helps to lay a solid foundation for improving agricultural competitiveness. Firstly, promote the centralization of land to backbone business entities. Through the establishment of farmland intermediary management institutions at the county level (equivalent to the provincial level in China), Japan use the government's credit conditions to collect the scattered rural land that needs to be transferred from the farmers' hands, and then lease them to the new backbone business entities at a low price. The establishment of agricultural land intermediary management agencies plays an important role in reducing land transaction costs and preventing excessive land rents. Secondly, reduce rice production costs. By promoting the reform of the agricultural operating structure, the competition between different business entities will be propelled, and the price of agricultural production materials will be reduced, thereby reducing the cost of rice production. Thirdly, promote the rejuvenation of agricultural practitioners. Encourage the labor in cities and secondary or tertiary industries to return to agriculture and encourage young students to work in agriculture. The government provides training guidance and policy support to those who have aspirations for farming and below the age of 45, and gives high subsidies to new farmers not only in terms of agricultural production and operating conditions, but also in terms of living security. In addition, Japan also pays attention to promoting the corporatization of agricultural management entities, which is also an important direction for the cultivation of agricultural management entities in Japan in recent years. Enhancing the competitiveness of small-scale farmers does not mean sticking to the management of small-scale farmers, and promoting the expansion of business scale and the increase of farmers' human capital are also important measures for improving the competitiveness

of small-scale farmers. It can be said that the objectives set forth in the "Vigor Create Plan" address the issue of Japan's lack of agricultural competitiveness, and combine the characteristics of its small-scale farmers operations to indicate the direction of development for enhancing the competitiveness of small-scale farmers.

(2)The newly revised “Basic Outline for Food, Agriculture, and Rural Areas” proposed in March 2015 strives to create a “strong agriculture,” and one of the characteristics of strong agriculture is that it is competitive. In order to achieve the "strong agriculture" goal, the revised "basic outline" has mainly formulated four policies. The first major category is the policies to ensure a stable food supply. The second major category is the policies to promote sustainable agricultural development. It is necessary to support the identification of agricultural, colonial, and agro-industry principal agricultural management entities through agricultural policies, to promote the development of agricultural legal persons and cultivation of agricultural talents. It is also necessary to continue to promote the concentration of land through agricultural land intermediary management agencies to avoid land loss. Diversified agricultural management entities are either upgrading small-scale farmers or using small-scale farmers to achieve organizational operation, which are all contribute to the improvement of small-scale farmers’ competitiveness. The third major category is policies of the revitalization of rural. The fourth major category is the policies of reform of agricultural group. The implementation of the reform plan of the Agricultural Association and the Agricultural Commission was emphasized.

## **5.2. Policy Implications**

China is the most typical representative of farming civilization and small-scale farming in East Asia. In recent years, the “floor” problem formed by increasing domestic agricultural production costs and the “ceiling” problem of international agricultural product price formation, as well as the problem of the increase of output, import and inventory and the problem of the increase of material, labor and land costs have become increasingly acute. The pressure of international competition faced by China is increasing day by day. Compared with Japan, it is more difficult for China to increase its agricultural competitiveness. This is not only reflected in the complex diversity of

the agricultural issue itself, but also because the agricultural issue in China is not only caused by agriculture itself, but also involves the issues of rural areas and rural people. The linkages between the “three rural issues” make the agricultural issue even more complex. According to the current situation of China's agricultural scale operation and the experience of Japan, the policy proposals proposed in this paper are as follows:

(1) Vigorously cultivate competitive new-type agricultural management entities

First, it is necessary to make breakthroughs in personnel training, strengthen training and support for agricultural practitioners, and strive to increase their human capital accumulation and cultivate new farmers. Second, it is necessary to achieve economies of scale. On one hand, strengthen the alliance among small-scale farmers and form effective agricultural cooperative organizations, which is relatively scarce in China and cannot meet the needs of improving the competitiveness of small-scale farmers. On the other hand, develop large-scale business entities that adapt to the national conditions, especially the family farms, and at the same time pay attention to those large-scale business organizations that rely on socialized services.

(2) Not blindly pursue large scale agricultural operation

With the expansion of farmers’ operating scale, the yield per unit of grain (rice, wheat, and corn) will show a clear downward trend after the scale reaches a certain level. At the current stage, excessively decentralized agricultural ultra-small-scale operation does not meet the requirements of agricultural modernization, and it is imperative to promote the transfer of land and promote large-scale operation. However, the scale of operation is by no means the bigger the better, and special attention must be paid to the scale.

(3) Strengthen the construction of agricultural infrastructure and reduce agricultural production costs.

Taking the needs of cultivating competitive agricultural management entities into consideration and promote agricultural mechanization, reducing adverse impact of the increasing labor costs on China's agriculture. It is important to strengthen farmland consolidation and construction of high-standard farmland, and to carry out farmland protection, creating better conditions for agricultural production and to improve the

efficiency of agricultural production. Improve the circulation system of agricultural products and innovate circulation methods, to improve circulation efficiency and reduce circulation costs.

(4) Increase financial support. First, increase financial subsidies for new-type agricultural management entities, and allow new-type agricultural management entities to undertake some financial projects, such as modern agricultural demonstration and advanced agricultural science and technology projects. Second, provide financial support to new-type agricultural business entities such as loans and discount loans. For disaster-prone areas and agricultural industries with high operational risks, more favorable insurance policies should be provided.

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