

# **Agricultural Machinery Industry in China**

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## **ABSTRACT**

The agricultural machinery industry in China has made great achievements and China's production of agricultural machinery has grown along with agricultural development in general. Since 2002, the annual growth rate of total output value of agricultural machinery and sales income exceeded 20 percent. Service client of agricultural machinery covers the whole agricultural field. An integrated system of agricultural machinery manufacturing has been established in China. Agricultural machinery made in China has entered the international market. Exports have been increasing rapidly.

The agricultural machinery industry in China is facing a new historic opportunity. Agricultural machinery will develop into a large, highly efficient industry with a complete range of products including intelligent computerized machines. Core competitiveness of enterprises will be raised and industry will gradually upgrade its facilities and products. Industry organizational structure will be optimized and a reasonable pattern will be formed.

## **AGRICULTURAL MACHINERY INDUSTRY IN CHINA**

China is a large, farming nation and agriculture is the foundation of the national economy. The Chinese Government has been paying great attention to rural development, as emphasized in the current five-year plan, and realizes that agricultural modernization is an important area of focus. Agricultural machinery is one of the requirements for achieving modernized agriculture. The agricultural machinery industry in China has made great achievements and China has become a major manufacturer of agricultural machinery. (Refer to tables)

Since the People's Republic of China was founded in 1949, the agricultural machinery industry has supplied many different kinds of agricultural machines, including diesel engines, tractors and implements such as combine harvesters, agricultural products processing machinery, animal husbandry equipment, irrigation and drainage pumps, and plant protection machinery. By the end of 2005, total power reached 685 million kW, including 1.4 million medium- and large-size tractors, 15.4 million small-size tractors, and about a half million combine harvesters. China has seen remarkable development in agricultural mechanization and the mechanization level of ploughing, sowing and harvesting has reached about 58 percent, 30 percent and 23 percent, respectively, in 2005.

### **1. Status of Agricultural Machinery Industry in China**

#### **1.1 Rapid development of Chinese Agricultural Machinery Industry**

The Chinese agricultural machinery industry has grown very rapidly in recent years. Since 2002, the annual growth rate in output value of agricultural machinery and sales exceeded 20 percent. The annual value of production and sales of the scale enterprises (diesel engine and water pump manufacturers are excluded) from 2002 to June 2006 are shown in Table 1-1. The growth rate for the first half year of 2006 surpassed 30 percent compared with the same period of 2005. It is estimated that the total output value and sales income for the entire 2006 fiscal year will be in excess of RMB130 billion.

The market for mainstream agricultural machinery, such as tractors of large- and medium-horsepower, combined has been very strong. The output of tractors of large- and medium-horsepower in 2005 was 3.6 times of that in 2002, and self-propelled combines were three times. Sales forecasts indicate that the output of tractors of large- and medium-horsepower this year will reach 200,000 units, and self-propelled combines will exceed 80 thousand units.

Table1-1. Total output value of industry and sales income 2002-2006

Year	Total output value of industry (100 million Yuan)	Sales income (100 million Yuan)
2002	635	552
2003	753	696
2004	896	859
2005	1083	1058
2006 (Jan.-June)	652	634

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Table 1-2. Output of tractors of large- and medium-horsepower  
(Unit: 10,000 sets)

Year	2002	2003	2004	2005	2006 (1-6)
Quantity	4.5	4.8	9.8	16.2	11.3

Table1-3. Output of self-propelled combines  
(Unit: 10 thousand sets)

Year	2002	2003	2004	2005	2006 (1-6)
Quantity	2.5	4.3	4.6	7.1	7.6

The main reasons for this rapid development are described below.

### 1.1.1 Government Policies Promoted the Agricultural Machinery Market

The Chinese government has placed great importance on agriculture, rural areas and farmers, and made a series of policies to assist farmers, such as added financial subsidies to agriculture, exemption from agricultural taxes, subsidies on grain planting

farmers and for purchasing higher quality seeds. The government has implemented the subsidies for farmers for purchasing agricultural machinery, and both central and local governments allocated a certain amount of capital (see table 1-4) to subsidize about 30 percent of the total price of agricultural machinery. Favorable government policies aroused the enthusiasm of farmers in field planting and the purchasing of agricultural machinery.

Table 1-4. Amount of subsidies provided by the government at different levels

(Unit: Million RMB)

Year	2004	2005	2006	
Central Government	70	300	600	
Local Government	410	800	1006	

### **1.1.2 Joint-use of Agricultural Machinery Drove Agricultural Machinery Markets**

Farmers who bought agricultural machines not only for their own family's use, but also to serve other farmers as a "for-hire" service for such operations as ploughing, planting, and harvesting. This not only raised the utilization rate of machines, but also brought economic benefits for the farmers. For-hire services for agricultural machinery have developed rapidly in China. At present, there are 33 million specialized hire services of agricultural machinery with more than 40 million people engaged in it with an annual revenue of RMB234.9 billion in 2005. The scale and business scope of agricultural machinery for-hire services has grown gradually and agricultural machinery hire services have become the principal drive for agricultural machinery purchases.

### **1.1.3 Adjustment of Agricultural Structure Widened the Agricultural Machinery Market**

The adjustment of the industrial structure of agriculture is gradually shifting from primarily grain production to an overall development of agriculture, forestry, sideline production and fisheries, and from traditional agricultural production to agricultural industrialization. The requirements for agricultural machinery products will continue to increase both in quantity and in scope as the market for agricultural machinery products broadens.

## **1.2 Scope of Agricultural Machinery Covers the Whole Agricultural Field**

The scope of agricultural machinery includes agriculture, forestry, animal husbandry, sideline production and fisheries. Owing to the vast territory in China, the natural

condition and economic situation varies from region-to-region. The categories of agricultural machinery also become complicated because of the many types required. At present, Chinese enterprises can manufacture about 3,000 kinds of agricultural machines under 95 small-type and 14 large-category. The output of main agricultural machinery in China in 2005 and in 2006 (Jan.-June) are as follows (see Table1-5).

Table1-5. Output of main agricultural machinery in China, 2005 and 2006

Name of Products	Unit	Output in 2005	Output in 2006 (Jan.-Jun.)
Big-mid-size tractor	set	162,000	113,000
Small-size tractor	set	1,746,500	1,012,000
Diesel engine	10,000kW	34,800	21,600
Harvesting machinery	set	209,700	206,400
Farm transportation machinery	set	1,757,000	952,000
Grain processing machinery	set	960,800	702,000
Feed processing machinery	set	129,900	83,600
Pump	set	29,043,000	17,219,600

### **1.3 Integrated System of Agricultural Machinery Manufacturing in China**

An integrated system of agricultural machinery manufacturing industry in China has been formed and it includes scientific research, manufacturing, sales and service.

#### **1.3.1 R & D system that Integrates Enterprises, Scientific Research Institutes and Universities**

Technology centers of enterprises have gradually become the main bodies for developing new products. Scale enterprises established technology centers, and medium- and small-sized enterprises established research departments, mainly engaged in designing new products.

There are over 20 research academies and institutes of agricultural machinery belonging to the central governments and provinces. They played an important role in fundamental research and new products development for agricultural machinery.

In a number of universities, there are research institutes and agricultural mechanization engineering specialties that relate to agricultural machinery design and manufacturing. They are engaged in the research of fundamental theory and general technology, as well as personnel training.

#### **1.3.2 Integrated Large-, Medium- and Small-scale Enterprises Form an Agricultural Machinery Industrial Chain**

There are about 8,000 agricultural machinery manufacturers in China. Among them were 1,578 scale enterprises in 2005, which included main machinery manufacture as well as accessories producers. They are the backbone of the agricultural machinery industry and they form a fairly complete industrial chain. Please refer to Table 1-6 for

the economic indicators of the scale enterprises.

Table 1-6. Data of the Scale Enterprises in 2005

Name	Economic indicators
Number of enterprises	1578
Gross output value of industry (100 million Yuan)	1083
Total assets (100 million Yuan)	691
Total profits (100 million Yuan)	41
Employees (10 thousand)	35

Diversification of the enterprise system has evolved. In the post-reform period and the opening up of China, restructuring of enterprises, joint ventures and international co-operation developed rapidly. With diversification of state-owned or state-owned holding enterprises, or private enterprises, three kinds of foreign invested enterprises have developed. Of the 1,578 scale enterprises in 2005, there were 1,178 private enterprises, 252 state-owned or state-owned holding enterprises, and 148 three kinds of foreign invested enterprises of three kinds. The percentage of the three kinds of enterprises was about 74 percent, 17 percent and 1 percent (see Fig.1-1). The percentage of sales income was about 65 percent, 20 percent and 9 percent (see Fig.1-2) and the percentage of assets was about 52 percent, 38 percent and 10 percent (see Fig.1-3).

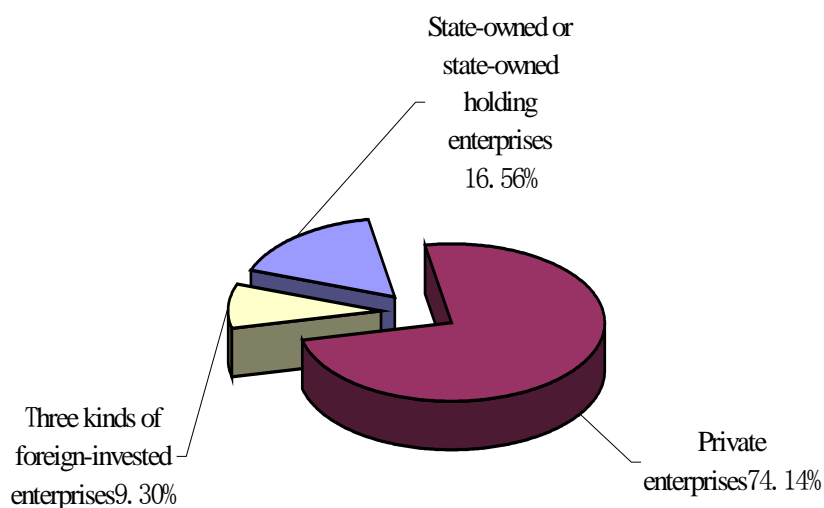


Fig.1-1. Structure of enterprises in 2005

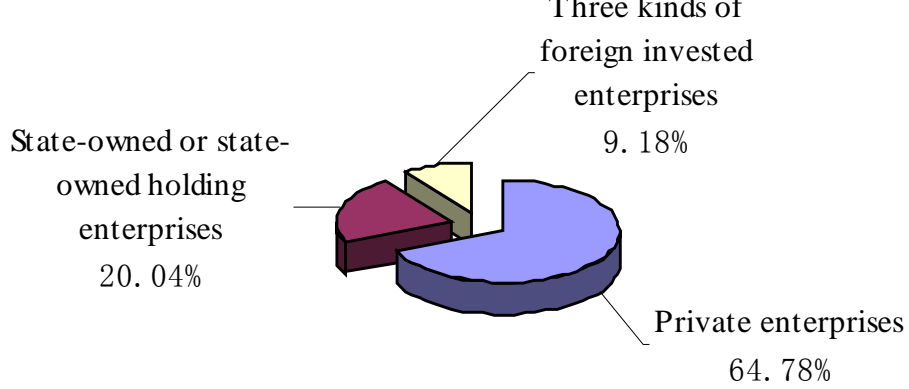


Fig. 1-2 Percentage of sales income of three kinds of enterprises

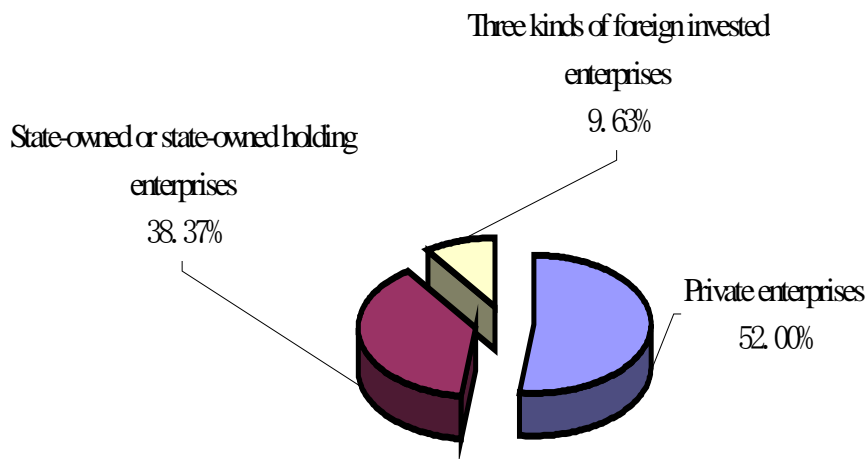


Figure 1-3. Percentage of assets of the three kinds of enterprises in 2005

### 1.3.3 The Quality Inspection and Supervision System Includes Self-Inspection and State Supervision.

Each enterprise has a quality-inspection department to guarantee the quality of their finished products. In addition to the China Agricultural Machinery Testing Center of Ministry of Agriculture P.R.C, there are provincial and municipal agricultural machinery testing organizations all over China. The General Administration of Quality Supervision, Inspection of the People's Republic of China set up 12 national-level quality inspection and testing centers for agricultural machinery products across China and there are 20 prefecture-level agricultural machinery authentication organizations. These organizations effectively promoted high-quality agricultural machinery products.

### 1.3.4 After-Sales Service System Formed by Sales Network of Enterprises, Agricultural Machinery Companies and Large Buyers of Agricultural Machinery

A special after-sales network of manufacturing enterprises has been gradually completed and special sales agents of medium- and small-enterprises are continually becoming more effective. Many agricultural machinery sales agents, mainly private companies located all over China, are distributing or selling agricultural machinery

products on commissions. In addition, there are nearly 20 large-scale agricultural machinery buyers, and about 100 medium- and small-sized ones in China, effectively supplementing and improving agricultural machinery distribution and after-sales service.

#### 1.4 The International Market with Rapidly Increasing Exports

China's agricultural machinery products started to enter international market after reform and the opening up of China.

The annual export of agricultural machinery increased each year (see Fig. 1-4) and the average annual growth rate reached approximately 37 percent. Note that imports have exceeded exports in recent years. The main reason for the adverse balance of trade is the increase in the importation larger powered diesel engines that are mainly equipped with automobile and engineering machinery. Exports and imports in the first half of 2006 were about equal at USD3.1 billion. Compared with the same period last year, exports increased 29.4 percent and imports increased 14.5 percent .

Exports reached about USD2 billion in 2005, although diesel engines and water pumps were not included (see Fig. 1-5), totaling about 5.8 times of that in 2001. Imports reached about USD1 billion, producing a favorable trade balance of about USD1 billion. Exports reached USD1.4 billion in the first half-year of 2006, an increase of 46.7 percent compared with the same period of last year. Imports were about USD0.5 billion, an increase of 9.1 percent compared with the same period last year.

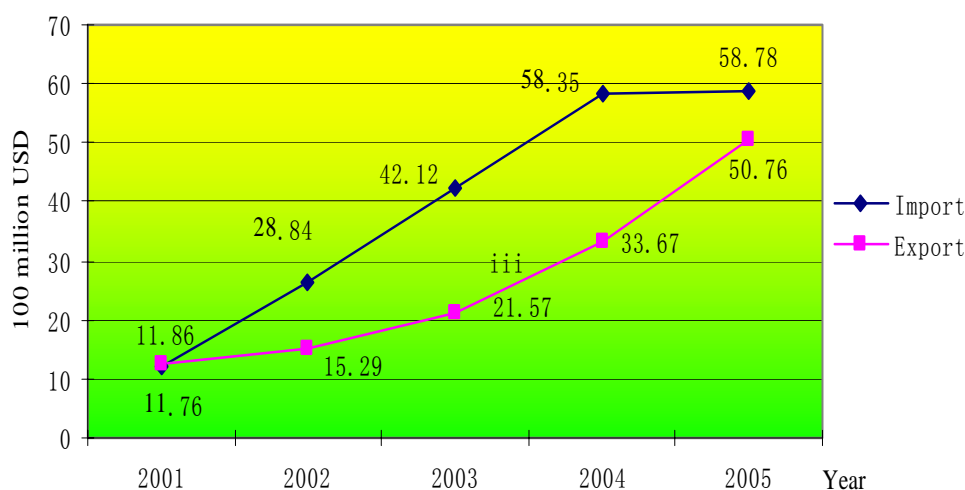


Figure 1-4. Import and export of agricultural equipment (including diesel engines and water pumps)



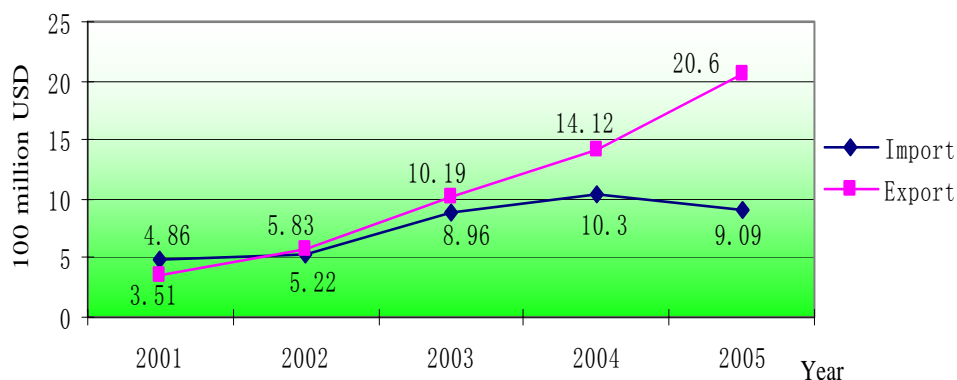


Figure 1-5. Import and export of agricultural equipment (excluding diesel engines and water pumps)

#### 1.4.1 Main Exported Products

(1) All kinds of agricultural irrigation machinery and spare parts that comprise 25 percent of total agricultural machinery were exported.

(2) All kinds of medium- and small-horsepower diesel engines and spare parts that comprised 21 percent of total agricultural machinery were exported.

(3) Diesel engine generator units and spare parts that comprised 16 percent of total agricultural machinery were exported.

(4) All kinds of tractors and spare parts that comprised 10 percent of total agricultural machinery were exported.

(5) Small gasoline engines and spare parts that comprised 10 percent of total agricultural machinery were exported.

(6) Harvesting machinery and spare parts that comprised 6 percent of total agricultural machinery were exported.

(7) Farm vehicles and agricultural trailers that comprised 4 percent of total agricultural machinery were exported.

#### 1.4.2 Main Exported Countries and Regions

Exports are currently sent to over 191 countries and regions. Among them, Asia received 44 percent, North America and Europe received 39.2 percent and the African market received 10 percent. The top eight countries receiving nations in 2005 were the USA, the United Arab Emirates, Japan, Indonesia, Vietnam, Germany, Nigeria and Italy.

## **1.5. Problems in Agricultural Machinery Industry in China**

### **1.5.1 The Main Products are Small-size and Moderate- to Low-Quality**

The low technology level and product structure does not meet the needs of the agricultural restructuring. Many large-sized products with high-technology content cannot be manufactured in China and must be imported from abroad.

### **1.5.2 Processing Equipment**

Processing equipment is obsolete, manufacturing quality is unsatisfactory and production efficiency is low.

### **1.5.3 Industry Structure**

Industry structure is not well organized, in disorder and the scale of the enterprises are small with low level of concentration of production. Large enterprises are not strong while the small ones are not professional.

## **2. DEVELOPMENT TRENDS OF THE AGRICULTURAL MACHINERY INDUSTRY IN CHINA**

### **2.1 Facing New Historical Opportunities**

The agricultural machinery industry in China will meet the developing new opportunities in the coming years and will maintain the steady development trend.

#### **2.1.1 Industrialized Agriculture**

China has entered the developing stages of industrialized agriculture with urban areas driving rural areas. With preferential policies of industry nurturing agriculture, the government is offering more and taking less in addition to providing free hands and financial subsidies that have been gradually increasing. These policies will surely make Chinese agriculture develop rapidly. The advancement of agriculture provides the basis for the development of the agricultural machinery industry.

#### **2.1.2 Industry Restructuring and Impact of Higher Wages**

As the agricultural industry restructuring has moved forward, farmers' incomes have been increasing, and joint-use of agricultural machinery has broadened. These trends establish a promising future for the agricultural machinery market and have laid a foundation for the agricultural machinery industry development.

#### **2.1.3 The Need for a Strong Investment System**

An investment system that focuses on farmer households and integrates functions of market- and government-controlled power provides favorable conditions for the development of the agricultural machinery industry.

#### **2.1.4 The Need for Modern Technology**

The development of modern technology provides support for upgrading the technological level of the agricultural machinery industry.

## **2.2 The Future of Agricultural Machinery**

Agricultural machinery will develop into large-size, highly-efficient machines with a complete range of machines and intelligent products.

### **2.2.1 Main orientation for product structure adjustment**

The main adjustment will focus on large- to mid-size machinery from the present mid- to small-size farm machinery; from single-purpose machinery to combined- and compound-operating machinery; from simplex farm operating machinery to the machinery that combines processes of agricultural production; from grain production machinery to other machinery needs for agriculture, forestry, animal husbandry and fisheries; from initial and primary processing machinery to precise and more complex processing equipment; from energy consumption types to the resource protection types of highly-efficient utilization of resources; from labor-intensive types to focus on equal importance of technology and human labor with application of high-technology so as to realize agricultural machinery transformation from low-end products as the main ones to those of high grade machines, highly efficient, machines with high-technology content.

### **2.2.2 Priority Development Technologies and Equipment**

Priority should be given to developing the technologies and equipment that guarantee efficient grain and cotton production with continuous upgrading the level of technologies and machines for wheat production, breaking through the bottleneck of planting and harvesting machinery for rice and corn production, and developing the key technologies and equipment for fiber and tuber crops.

Priority should be given to developing the technologies and equipment that guarantee the sustainable development of agriculture, such as equipment for conservation tillage, mechanization of dryland water-saving irrigation, water resources circulation and highly efficient water utilization equipment.

Priority should be given to developing the technologies and equipment needed for promoting agricultural restructuring, such as production equipment for industrial crops, and facilities and equipment for livestock healthy raising and feeding of livestock.

Priority should be given to developing the complete technologies and equipment needed to upgrade safety in the production of agricultural products and food, such as a complete range of equipment for agricultural production and processing.

Priority should be given to developing the technologies and equipment for agricultural machinery automation, information technology and artificial intelligence.

### **2.2.3 Major Developing Products**

- 130-200 horsepower tractors and the associated implements
- Multi-function general combines with high efficiency, e.g corn and wheat combines.
- Harvesters for fiber crops.
- Combines for energy and fodder crops.
- Large-sized self-propelled sprinklers.

### **2.3 Core Competitiveness**

Core competitiveness of enterprises will be raised and industry will upgrade gradually.

#### **2.3.1 Breakthroughs in the Field**

Breakthroughs will be achieved and core technologies will be formed.

#### **2.3.2 Role of Present Manufacturing in the Future**

Use present manufacturing technologies to transform the traditional ones so as to realize modernization manufacturing methods.

#### **2.3.3 Upgrades to the Management System**

Ceaselessly upgrade the management system and mechanism so as to enhance the vitality of enterprises.

### **2.4 Industry Organizational Structure**

Optimize the industry organizational structure and develop improved operating procedures.

#### **2.4.1 Role of Large Enterprises**

Three to five large enterprises with sales income exceeding RMB10 billion per year will evolve to lead the development of the entire industry.

#### **2.4.2 Role of Smaller Enterprises**

A large group of medium- and small-enterprises with the characteristics of “professionalism, precision and specialization” will be formed and become the principal backbone of the industry.

#### **2.4.3 Capital Structure**

Capital structure will be improved with a mix of three kinds of foreign-invested enterprises and private enterprises.

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