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On Competitiveness of Agricultural Industrial Clusters in Hubei Province Based on GEM Model

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Abstract Firstly, this paper summarizes concept of the agricultural industrial cluster and GEM model. Then, it analyzes the competitiveness of agricultural industrial clusters in Hubei Province from three aspects, namely, the foundation, enterprises and market. In the aspect of the foundation, Hubei Province has superior geographical location, rich natural resources, abundant human resources, diversified capital sources, and hardware and software facilities. In the aspect of enterprises, agricultural suppliers (farmers) are relatively scattered in Hubei Province, organizational level of relevant enterprises is constantly improved, and structure and strategy of enterprises are constantly innovated. In the aspect of market, the competition of agricultural products is fierce in local market, and it is difficult to explore external market. Finally, it presents countermeasures to improve the competitiveness of agricultural industrial clusters in Hubei Province, including building agricultural industrial park and cultivating key leading enterprises, strengthening innovation management, and increasing financial support.

Key words Agricultural industrial clusters, GEM model, Competitiveness, Countermeasures and recommendations

Agricultural industrial cluster is an essential stage of agricultural modernization development, and many provinces and cities in China are building characteristic agricultural industrial clusters^[1-2]. As a large but not powerful province, Hubei Province relies mainly on extensive operation and there is still certain gap compared with other domestic developed provinces. To push forward socio-economic development, Hubei Province must energetically develop modern agriculture, especially, agricultural industrial clusters. Therefore, analysis on the competitiveness of agricultural industrial clusters of Hubei Province and understanding actual development level of agricultural industrial clusters will have actual significance to improving the cluster competitiveness.

1 Agricultural industrial clusters and GEM model

About definition of the agricultural industrial cluster, both scholars at home and abroad have different opinions. Here, the idea of Michael E. Porter is introduced to define the agricultural industrial cluster. It refers to an organic whole formed by various agricultural organizations and their supporting environment that are close in region and have mutual relationship in the industrial chain. Inside agricultural industrial clusters, there shall be certain common and complementary features, which need mutual cooperation to form characteristic competitive edge.

To analyze the competitiveness of industrial clusters, Porter put forward the famous "Diamond Model". Canadian scholars Hervey Gibson and Tim Padmore studied the Diamond Model and introduced the GEM (Groundings + Enterprises + Market) model. GEM model mainly involves 6 factors influen-

cing competitiveness development of industrial clusters: (i) resources; (ii) facilities; (iii) suppliers and relevant supporting industries; (iv) structural competition and strategies of enterprises; (v) local market; and (vi) external market. These 6 factors are divided into 3 groups: groundings (including resources and facilities); enterprises (including structure and strategies of enterprises, suppliers and relevant supporting industries); market (including local market and external market).

GEM model considers little of competition and cooperation within industrial clusters, but analyzes these three factors in detail, so it is quite persuasive in explaining the formation of competitiveness of agricultural industrial clusters^[3].

2 Analysis on competitiveness of agricultural industrial clusters in Hubei Province based on GEM model

2.1 Grounding factors: resources and facilities

2.1.1 Resources. Resources mainly include geographical location, natural resources, human resources and capital resources.

(i) Superior geographical location. With natural endowment of location, Hubei Province is the key to the centre of nine provinces. The golden waterway of Yangtze River flows the whole province for 1 038 km, 8 national highway, Beijing – Zhu-hai Expressway, Shanghai – Chengdu Expressway, Yinchuan – Wuhan Expressway and Suizhou – Yueyang Expressway make Hubei Province become an important junction linking national network of highways.

(ii) Rich natural resources. Hubei Province has abundant and diverse agricultural resources and superior natural conditions. Ground forms are various and there is Jiangnan Plain, hills, mountainous areas, and wide water areas suitable for aquaculture. It belongs to subtropical monsoon moist climate

zone, has combined features of subtropical and temperate zones, and has sufficient sunshine and water resources. Biological resources are diverse, have transitional features of northern and southern areas. Also, it is situated in the transitional area of east and south plant system, so agricultural biological resources are ample.

(iii) Sufficient human resources. At the end of 2009, Hubei Province had 104.4 million households, 401.8 million people living in rural areas, 212.3 million agricultural population, and the total number of people going outside to work reached 9.72 million^[4]. It shows that Hubei Province has rich rural labor forces. In addition, Hubei Province holds numerous agricultural scientific and technological talents, and sufficient talent reserve. In the whole province, there is a total of about 5 000 agricultural scientific and technological talents, including 8 agriculture-related academicians of the Chinese Academy of Sciences, and 4 academicians of Chinese Academy of Engineering.

(vi) Capital resources have many sources but still need huge input. Hubei Province mainly pushes forward innovation upon three system and mechanisms of financial support for agriculture. The first is integration of financial support for agriculture, the second is performance distribution mechanism, and the third is multiple input mechanism. Financial departments at all levels of Hubei Province guide financial capital and social capital to invest in agriculture, bring into play of guiding and absorption role of financial funds, and attract industrial and commercial funds and nongovernmental funds to invest in agriculture, countryside and farmers through financial discount, replacing compensation by reward, running by the local people and subsidized by the state, and first construction and later compensation.

2.1.2 Facilities. Facilities include hardware and software facilities.

(i) Hardware facilities mainly refer to transportation, infrastructure, communication network and electric power facilities. Hardware facilities for cluster development of Hubei Province agricultural industries have following characteristics: firstly, convenient transportation facilities. All levels of transportation departments of Hubei Province energetically push forward integrated development of rural roads, stations and transportation. Rural road construction has made historical achievements. It basically realized cement road in every township, 97.1% administrative villages have roads, 43% administrative villages have cement roads, and 98% and 69% townships and administrative villages have regular buses. Secondly, capital construction lags behind. On the one hand, agricultural infrastructure is constantly improved and land use degree becomes higher and higher. And agricultural mechanization moves forward at a faster pace. On the other hand, some provinces have weak agricultural infrastructure and the anti-disaster ability is relatively low. In Hubei Province, most water conservancy facilities become aged, soil fertility heavily overdrawn, and production capacity generally declines. Thirdly, communication network has a high coverage rate. Hubei Province has achieved a historical leap in rural communication development through extending

network to every administrative and natural villages, extending broadband to every towns, and sending information to rural areas. By the end of 2010, the whole Hubei Province had completed the task of extending telephone to 2 352 natural villages; 99.65% natural villages that have more than 20 households were connected with telephone; 21 765 administrative villages (up to 83.4%) were connected with broadband, and 18 821 administrative villages (about 72.1%) were connected with optical cable. In Hubei Province, rural broadband users have reached 680 000 households. Fourthly, electric power infrastructure is constantly improved. Under the unified plan of the State Grid, Hubei Province realized the objective of "every household access to electricity". However, with rapid development of rural economy, in some remote rural areas, the quality of electric energy is not high, and some rural electric network is relatively weak in structure. In 2010 to 2012, Hubei Province launched the second time large scale rural electric network transformation, in the hope of eliminating the problem of shortage and low voltage frustrating rural power consumption, and to provide reliable electric power support for rural development.

(ii) Software facilities refer to policies and regulations, scientific research system, and industrial association, etc. Software facilities for cluster development of Hubei Province agricultural industries have following characteristics: firstly, great support of policies and regulations. Works of agriculture, farmers and countryside have become the top priority of the government, which creates favorable environment for rural agricultural and economic development. As a large agricultural province, Hubei Province is being faced with better and better policy environment. China is deepening the implementation of the central China rising strategy, which will provide powerful policy support for Hubei Province to march toward a strong agricultural province. As an important one of China's grain production bases, Hubei Province will make its objective of developing modern agriculture clearer and the policy basis of developing modern agriculture more solid. Secondly, scientific research system is complete. One of the greatest advantages of Hubei Province is science and education resources. The overall science and education strength of Hubei Province ranks the third in the whole country, and many universities, colleges and research institutes are located in Hubei Province. Besides, there are numerous famous, senior and excellent professors and experts in Hubei Province. In grain, cotton and oil, livestock or poultry and aquatic breeding, biological engineering, grain and oil processing, grain and oil machinery manufacturing, grain and oil quality inspection, crop economy, and enterprise management, Hubei Province has powerful scientific research strength and have made scientific research achievements at national and provincial level. This is a powerful intellectual support for developing agricultural industrialization in Hubei Province. Thirdly, there is great support of industrial associations. All levels of industrial associations in Hubei Province play important role in development of agricultural industrialization. For example, the members of Hubei Province Association of Agricultural Means of Production include over 10 large backbone enterprises and

more than 60 supply and marketing cooperative, production and sales companies. Hubei Province Association of Agricultural Means of Production is mainly responsible for coordinating and organizing member units to establish strategic alliance of production, circulation and scientific research of agricultural means, to serve agriculture, countryside and farmers better, and reinforce industrial discipline, to fight against conducts cheating farmers.

2.2 Enterprise factor: structure and strategy between suppliers and relevant enterprises and manufacturers

2.2.1 Suppliers and relevant enterprises. Suppliers and relevant enterprises mainly refer to development situations and specialized production degree of suppliers within the industrial cluster, and quantity of interrelated enterprises. In agricultural industrial clusters, farmers are suppliers. With expansion of farmers' decision-making power in operation, their production activities gradually play a decisive role in the development of agricultural industrial clusters. On the basis of stabilizing the rural household contract management system, Hubei Province has innovated upon forms of rural operating organizations, energetically developed various rural professional associations and cooperatives which have become important forces of rural industrial operation. Some farmer households and enterprises and intermediaries established certain contact, but the real order production farmers only take up about 10%. Besides, organization and management are loose and benefit relationship is not close, so it is universal that farmers place orders but not implement. Most agricultural products still rely on production and sales by farmer households themselves, which is not adapted to changeable market.

2.2.2 Structure and strategy of enterprises. Structure and strategy of enterprises involve enterprise scale, management model and innovation model within the industrial cluster.

(i) Scale of leading enterprises is gradually enlarging, but the overall strength is relatively backward. In 2010, there were 434 agricultural industrial leading enterprises, 33 national level leading enterprises, 27 534 various agricultural industrial organizations in Hubei Province. Leading enterprises have high comprehensive strength. More than 5 600 agricultural industrial leading enterprises realized annual sales revenue of 5 million yuan, and 26 enterprises realized annual sales revenue of 1 000 million yuan in 2010. In the same year, the total amount of fixed assets of leading enterprises reached 112.53 billion yuan, sales revenue of 451.49 billion yuan, the total profit up to 34.6 billion yuan, the foreign exchange earning up to 1.08 billion USD, and 17.71 billion yuan turned over to the state^[5].

Nevertheless, compared with other developed provinces, leading enterprises of Hubei Province are small and the benefit is not closely connected between farmers and enterprises. In Hubei Province, leading enterprises above designated scale are weak in the overall strength. Besides, industrial development is not balanced. Planting and processing enterprises develop comparatively rapidly, livestock and poultry and aquatic product processing enterprises develop slowly, especially, the live pig and meat chicken processing is not consistent with the status of

large live pig and poultry province. Furthermore, oil and lobster industrial processing capacity is relatively surplus, and much enterprise assets lie idle. The benefit is not closely connected between enterprises and farmer households. Farmer households' breach of contract and leading enterprises struggling for benefits with farmers are not favorable for overall promotion of agricultural industrial operation in Hubei Province.

(ii) Management model is diverse and management system needs to be improved. Currently, the agricultural management model in Hubei Province is mainly divided into following three types. Firstly, agricultural industrial park model. In 2009, Hubei Provincial Party Committee and Provincial Government established 20 agricultural product processing demonstration parks, which gathers scattered agricultural enterprises and strengthens the connection effect between industries. For example, Xian'an Sengong Industrial Park has realized labor division and cooperation, and saved cost and resources from original wood purchasing to slab processing, floor and furniture production and logistics distribution. Secondly, agricultural leading industry guiding model. Hubei Province adopts "company + base + farmer household" organizational form to establish modern agricultural industrial system through promoting scientific and technological development, technical guidance service, production, processing and marketing integration. For example, Hubei Tongxing Agriculture Limited Company has set up a modern poultry industrial system that integrates hens breeding, poultry chick incubation, feed formula, raising and recovering, slaughtering and packaging, as well as marketing. Thirdly, project promotion model. Based on agricultural industrial project, this model is to promote construction of fine and special characteristic agricultural products, fine and deep processing and industrial process, and gradually establish and perfect the modern agricultural industrial system. For example, Qianjiang City, focusing on lobster industrial project, has gradually built and formed the lobster production system, marketing system, technical training and service system and professional cooperative system, and has become the largest base of lobster production, processing and export in China. Nevertheless, the enterprise management system in Hubei Province is still not perfect. The transformation of shareholding system in some enterprises is not complete; the property right of some enterprises is not clear; the independent operation ability is not high; there is still workshop-based production, traditional operation and familial management, thus it is urgent to standardize management or upgrade the industry.

(iii) Multiple innovation models. Innovation upon interest connection: The connection of interests between farmer households and enterprises is further standardized and improved. At present, 70% adopt method of purchases and sales contracts, 8% adopt cooperation method, 8% adopt cooperative share system, and 14% adopt other methods. The total amount of order exceeds 40 billion yuan and performance rate of contract is up to 87%. Brand innovation has made new achievements. The total number of harmless, green and organic and GI agricultural products in Hubei Province reached 3 997, among

which 21 brands were awarded as "Chinese Famous Brand Products", 24 trademarks were designated as "Chinese Well-known Trademarks", 6 brands were awarded as "Chinese Famous Agricultural Products", and nearly 600 brands were famous in Hubei Province. Scientific and technological innovation has made significant achievements. In 2010, scientific and technological model households reached 368 000 in Hubei Province, and the contribution rate of progress in agricultural science and technology rose from 50% in 2005 to 54% in 2010, 2 percentage points than the national level^[6].

2.3 Market factor: local market and external market

2.3.1 Local market. China is in the transition period of rise of economic level, growth of population, reduction of cultivation land, limited production capacity and growth and upgrade of demands, thus it imposes requirements on both the total quantity and quality of agricultural products. Agricultural product market should be oriented towards expanding domestic demand. Although local market has huge demand, agricultural product competition in other provinces becomes increasingly fierce. Therefore, Hubei Province should formulate proper strategies to further develop market.

2.3.2 External market. Agriculture of Hubei Province is basically internally-oriented industrial structure, and the proportion of foreign exchange earning is small. With the completion of transition period of WTO entry, tariff and non-tariff protection measures for agricultural products are both weakened, which creates a huge impact on staple agricultural products of Hubei Province. Labor intensive products, such as livestock products, gardening products, honey and vegetable, have certain price advantage but the standardization level is low, in addition to higher and higher foreign technical barrier, the export prospect is not optimistic.

3 Countermeasures and recommendations for improving competitive power of agricultural industrial clusters in Hubei Province

3.1 Building agricultural industrial park and cultivating key leading enterprises

To develop agricultural industrial clusters, Hubei Province should establish a batch of agricultural industrial parks to attract various agricultural enterprises, especially leading enterprises. Besides, it is recommended to bring into full play the gathering effect of industrial parks and build agricultural industrial chain. What's more, is should strengthen infrastructure construction of industrial parks, perfect various service functions, constantly raise the carrying capacity and attraction, give prominence to industrial characteristics, promote cluster and integration of the same type industries, to realize scale effect of industry and region. In particular, it should focus on cultivate and support leading enterprises that have comparative advantages, attract other enterprises in the industrial chain, integrate resource elements, carry out trans-regional, trans-industrial and trans-ownership alliance and cooperation, and encourage leading enterprises to form close benefit community with farmers, to let farmers share more achievements of industrial operation.

3.2 Strengthening various innovation management

Leading enterprises should increase investment in scientific and technological research, strive to grasp the state-of-the-art technology, strengthen cooperation with scientific research institutes, colleges and universities, and technical popularization departments, energetically develop and popularize new products, technologies, processes and equipments, and to gradually become modern enterprises that possess independent intellectual property right and have high innovation ability. Hubei Province should encourage farmers' professional cooperatives to participate in leading enterprises in many ways, guide farmers' professional cooperatives to organize trans-regional cooperation with the aid of advantages in talent, fund, technology and market resources, strengthen service functions and expand development space. In addition, it is proposed to promote "leading enterprises + professional cooperatives + farmer households" organizational forms, guide farmers to buy a share with agricultural means of production such as fund, skill and labor, and support leading enterprises and farmers' professional cooperatives to establish voluntary, equal, benefit and risk sharing mechanism with farmer households in the way of made-to-order farming, bonus sharing, and profit return, to guarantee sustainable and healthy development of enterprises^[7].

3.3 Increasing financial support Finance departments at all levels should increase financial support for agricultural industrialization. In particular, it is required to support provincial industrial parks and large processing counties. Funds allocated by central authorities and relevant provincial departments for supporting agricultural industrialization projects should be used in these key leading enterprises and key projects determined by the provincial government. Financial institutions at all levels should include those qualified leading enterprises and cooperatives into the priority support subjects, improve flexible loan models, and provide high quality supporting financial services for leading enterprises and cooperatives.

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