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Tows Matrix Analysis on Developing Urban Agriculture in the Pearl River Delta Area

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Abstract Based on the introduction of the profile of Pearl River Delta area, the strengths, weaknesses, opportunities and threats of developing urban agricultural in Pearl River Delta area are analyzed by using the SWOT analysis. The strengths are analyzed from three aspects, covering natural resources, geographic advantages and technological advantages; the weaknesses are analyzed from the terms of land resources, labor cost, industrial scale and quality of personnel involved; opportunities are analyzed from the aspects of potential clients, favorable policies and markets; the threats are analyzed from two aspects, including concept factor and income gap between urban and rural areas. on the basis of the above analyses, the countermeasures and suggestions on the development of urban agriculture in the Pearl River Delta area are put forward.

Key words Pearl River Delta area, Urban agriculture, SWOT analysis, China

Urban agriculture, which locates in urban area, provides people with resort and opportunities of experiencing agriculture and getting to know countryside life by using pastoral-sight, natural ecology and resources and combining animal husbandry and fishery production, agricultural operations and agricultural culture and lifestyle. Urban agriculture relies on the great influences of technology, economy and social force, and it integrates the industry, commerce, and service industry into a whole and increases farmers' income through pushing forward the restructuring of agricultural structure by connecting two-way communication and connection with the rural areas. Therefore, urban agriculture can well integrate agricultural production, countryside lifestyle and ecological functions into a whole[1]. According to the basic situation and development demands of Pearl River delta area and by mirroring the experiences of western countries in developing urban agriculture, it is necessary for the traditional agriculture to transfer into urban agriculture. By using the SWOT analysis, I analyzed the strengths, weaknesses of developing urban agriculture in Pearl River delta area, as well as the external opportunities and threats. Countermeasures and suggestions for developing urban agriculture in the Pearl River Delta area are put forward.

1 The general situation of the study area

The Pearl River Delta area starts from Guangzhou in the north and continuously fanes to the southeast and southwest. It neighbors on Shenzhen, the miraculously developed special economic zone, and Dongguan in the east. In the west of the Pearl River Delta area, there are the historical prestigious Foshan city (covering the prefecture of Nanhai, Shunde, Gaoming and Sanshui); part of the regions of five cities of Jiangmen, which is the biggest hometown for oversea Chinese in China; Zhongshan City, the hometown of Sun Yat-den; Zhuhai, the special economic zone which borders with Macau. In broad sense, Hong Kong and Macau are two angles of the Pearl River Delta area, but in fact, Guangdong, Hong Kong and Macau have formed the close and mutual development relations in terms of economy and tourism. The advantages make the Pearl River Delta area to be one of the most frequently visited areas in China[2].

On January 8, 2009, State Development and Reform Commission issued the *Reform and Development Plan for Pearl River Delta* (2008 –2020) in the press conference sponsored by the Information Office of the State Council. The plan takes the Guangzhou of Guangdong Province, Shenzhen, Zhuhai, Foshan, Jiangmen, Dongguan, Zhongshan, Huizhou and Zhaoqing as the main body to radiate the pan-Pearl River Delta area, and the relevant content about cooperating with Hong Kong and Macau are bought under the plan to further promote the role played by the Pearl River Delta area in stimulating and exampling the national economy. Through providing favorable transportation environment for the economic integration in the Pearl River Delta area, the Plan provides assistance for the construction of ecological economy zone in the central area of the Pearl River Delta[3].

2 The Tows Matrix Analysis on the development of urban agriculture in Pearl River Delta area

2.1 Strengths

2.1.1 Natural advantages. The Pearl River Delta area with the area of about 11 000 km^2, locates in the coastal area of eastern Guangdong Province, the bottom boundary of it starts from the Sanshui City in the west to the Shilong of Guangzhou in the east, and the summit of it lies in the Yamenwan. The Pearl River Delta area belong to the subtropical climate and it is warm and moist all over the year with the annual mean temperature from 21 ℃ to 23 ℃, and the hottest average temperature

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of over 28 ℃ in July. From June to October, the area is often hit by typhoon and intensive precipitation. The annual precipitation is above 1 500 mm. The rainy season goes along with the high temperature season, so the soil is fertile and the rivers are bountiful, which is helpful for agricultural production. In addition, the rice grain yield per unit area ranks first in China. Besides, the Pearl River Delta area is home to about 50 kinds of tropical and subtropical fruits, including Litchi, orange, banana, pineapple, euphoria longana, star fruit, mango, grapefruit and lemon and so on. The Pearl River area has developed the three-dimensional structure of agriculture, including Mulberry fish ponds, Fruit fish ponds and Cane fish ponds and so on, which has become the paragon of Chinese ecological agriculture.

2.1.2 Geographical advantages. By the end of 2008, the total mileage of roads in the Pearl River Delta area has achieved 53 000 km. In 2012, the mileage of highway in the Pearl River Delta area will achieve 3 000 km. The water transportation is very convenient in the Pearl River Delta area with eight huge inlets, advanced river network and numerous ports. The Beijing – Guangzhou railway, Beijing – Jiulong railway, Guangzhou – Jiulong railway, Guangzhou – Maoming railway and the Guang-MeiShan railway run across the prefecture of the Pearl River Delta area, the high-speed railway of Guangzhou – Shenzhen to be is included. At present, the high-speed road network, which takes the Guangzhou as a core or takes the central cities of the Pearl River Delta as a core is under construction. The airline in the Pearl River Delta area, which takes Guangzhou BAIYUN Airport as the hub, has connected with the airline in central cities all over the nation and many international cities. With the return of Hong Kong and Macau, the Pearl River Delta area becomes the areas with the most advanced transportation in China. The advanced transportation provides guarantees for people who want to enjoy urban agriculture, as well as ensures the input of urban agriculture in the Pearl River Delta area.

2.1.3 Technology and policy advantages. The *Reform and Development Plan for Pearl River Delta* (2008 – 2020) takes the positive development of modern agriculture as an important part of forming the modern industrial system, which is characterized by advanced industrial structure, concentrated industrial development and high-level industrial competitiveness in the Pearl River Delta area. The plan proposes that the transference of the development pattern of agriculture should be accelerated and the agricultural industrial structure should be optimized according to the demands of high output, high quality, high efficiency and safety; the urban and export-oriented agricultural industrial system with the distinct of Lingnan style should be established so as to realize the modern agricultural industrial system. In terms of promoting agricultural development by using high technology, Zhuhai has solved 3 to 5 items of key technological problems, 10 to 15 items of high technology , advanced application technology and traditional agricultural technology, at the same time, Zhuhai has supported 8 to 10 enterprises with the comprehensive development of ecological agriculture to the scale operation.

2.2 Analysis on weakness

2.2.1 The scantiness of land resources. The Pearl River Delta area, with advanced industry, dense population and high urbanization, is one of the most advanced city cluster in China. The agricultural land in the Pearl River Delta area bears not only the burden of providing agricultural products and agricultural by-products of residences in the areas, greening and beatifying the city, but also the special functions of providing the urban land use expansion and industrial land use. However, there is only 41 700 km^2 of land in the Pearl River Delta area. What's worse, the farmland along the both sides of the Pearl River mouth is losing by an annual speed of 92.57 km^2. In the Pearl River Delta area, the farmland per capital is only 0.33 acre, 23.4% of the farmland per capital in China, which is far lower than the national average level and does not achieve half of the warning line of 0.8 acre per capital stipulated by The Food and Agriculture Organization of the United Nations. With the rapid development of urbanization and industrialization, numerous land has been occupied, which tenses the scanty land resources and gravely affects the further development of the Pearl River Delta area.

2.2.2 High labor costs. It can be seen from Table 1 that from 2006 to 2008, the gross production and input per capita have been increasing gradually. In 2008, the proportion of the primary industry, the secondary industry and the tertiary industry is 2.4%,50.3% and 47.3% respectively ,but the per capital output value of the primary industry, the secondary industry and the tertiary industry is 8 480 yuan, 178 270 yuan and 167 610 yuan respectively in the Pearl River Delta area. Therefore, in the Pearl River Delta area, which is dominated by the secondary and tertiary industry, the labor costs are relatively higher and its opportunity costs of land and labor are high, thus leads to the higher labor costs than other areas around it.

Table 1 Per capita output value of the three industries in the Pearl River Delta area

Year	Output of the primary industry $\times 10^8$ yuan	Per capita output of the primary industry $\times 10^4$ yuan	Output of the secondary industry $\times 10^8$ yuan	Per capita output value of the secondary industry $\times 10^4$ yuan	Output of the tertiary industry $\times 10^8$ yuan	Per capita output of the tertiary industry $\times 10^4$ yuan	Total population of the nation $\times 10^4$ people
2006	567.78	0.676	11 110.79	13.232	9 930.06	11.826	839.69
2007	625.40	0.752	13 046.80	15.691	11 934.67	14.353	831.49
2008	711.45	0.848	14 964.60	17.827	14 069.52	16.761	839.42

Note: Data is collected from *Guangdong Statistical Yearbook* from 2007 to 2009.

2.2.3 The industrial scale of urban agriculture is small in the Pearl River Delta area. As a result of the division of the administrative region, agriculture in rural areas of the Pearl River Delta still develops independently by the minimum unit of villages and towns, and it is still the " small-scale peasant economy" under the traditional mode[4]. The industrialized production

scale of developing urban agriculture has not been formed. The development of urban agriculture is imbalance, which is characterized by backward development of competitive industry with the distinct of countryside, relatively poor processing of agricultural products, low standard of production level and the imperfect management level of agricultural industrialization. In addition, the coverage of the rural cooperative economic organizations is low, and the functions of many cooperative economic organizations have not been fully displayed.

2.2.4 The educational quality of the personnel involved needs improving. One of the features of the urban agriculture is the agricultural personnel involved, who have high educational quality and high quality. But at present, the high quality people is absent in the Pearl River Delta area, for in this areas, many farmers have only accepted the junior middle school education. the specific situation is listed on Table 2.

Table 2 Quality of rural labor forces employed in primary industry %

Year	Illiteracy and half-illiteracy	Primary school education	Junior middle school education	Senior high school education	Technical secondary school education	Junior college education or above
2006	7.0	36.3	45.9	9.9	0.7	0.2
2007	7.2	35.6	46.3	10.1	0.6	0.2
2008	7.0	34.4	46.9	10.3	1.0	0.3

Note: Data is collected from *Guangdong Statistical Yearbook* from 2007 to 2009.

From the above data, it can be seen that over 80% of rural young people has only accepted the primary school education and junior middle school education. They lack high scientific quality, technologic awareness, the ability to apply agricultural technology and the assembly capacity, thus the negative results arisen from it are extensive. Therefore, the quality of the personnel involved in urban agriculture should be improved.

2.3 Analysis on opportunity

2.3.1 The huge market of potential consumers. According to the 2009 *Statistics Bulletin of the National Economic and Social Development of Guangdong Province*, the consumption structure of residents in the Pearl River Delta area shows the well-off sign, so the situations of establishing urban agriculture have been prepared well. The Pearl River Delta area has promising market prospect, convenient transportation, economic advantages and the consumers bought by its geographic advantages, which provide wide prospect for developing urban agriculture in the Pearl River Delta area. Currently, the life style and leisure style of the urban residents have changed gradually. In terms of daily lif, with the improvement of the quality of life, people pay more and more attention to green healthy and nuisance products with high quality. In terms of leisure, the urban residents want to experience the leisure and rural life style to get relaxed. Hence, their demand on rural leisure lifestyle is more and more greater. At the same time, the high-income class and middle class account for a large proportion in the Pearl River Delta area, so it is helpful to enlarge the production of products with high added value. In recent years, the disposable income of urban residents in Guangdong Province shows the annual upward trend. In 2008, the per capita disposable income of urban residents in Guangdong Province has achieved 19 732.86 yuan (Table 3), and the life of the residents are transferring from the material level to the higher sprit level.

2.3.2 Favorable policy environment. Since the sixteenth Conference of Communist Party, the Party Central Committee and the State Council have continuously issued five Document No. 1 on directing the agriculture and rural affairs, which highlight promoting the income increase of farmers, promoting the comprehensive production capability of agriculture, pushing forward the construction of socialist new village, developing modern agriculture and strengthening the construction on rural infrastructure respectively. In the third and fourth Plenary Session of the Eleventh Central Committee and the Central Rural Work Conference, the stress is laid on revolving around the targets of rural development, rural prosperity and income increase of farmers. And the main tasks of rural work are improving the equipment of agricultural machine; refining the equipment structure; improving the level of agricultural mechanization; lifting the comprehensive production capability of agriculture; developing modern agriculture and promoting the agricultural machine industry and service industry[5]. In 2010, the central government stipulates that the capital scale of the subsidies provides to Guangdong Province is 0.2 billion yuan for purchasing agricultural machines, so as to let more farmers benefit fro the preferential policies. The above issued policies show that if the Pearl River Delta fully makes use of these preferential policies, it has the advantages in developing urban agriculture.

Table 3 Comparison of the income between rural and labor residents in Guangdong Province Yuan

Year	Per capita disposable income of urban residents	Per capita net income of rural residents	Difference between urban and rural income	(Urban-rural income ratio (the rural income is taken as 1)
2006	16 015.58	5 079.78	10 935.80	3.153
2007	17 699.30	5 624.04	12 075.26	3.147
2008	19 732.86	6 399.77	13 333.09	3.083

Note: Data is collected from *Guangdong Statistical Yearbook* from 2007 to 2009.

2.3.3 Market support. The Pearl River Delta has the geographic advantages for it borders with Hong Kong and Macau and its numerous compatriots from the overseas. It relies on both the domestic market and the overseas market to push forward the high-level and rapid development of export-oriented economy, and the form of industrial industrialization has been formed basically. Since the reform and opening up, with the acceleration of urbanization, the market-oriented and socialized agriculture in the Pearl River Delta has been formed in the primary stage. The development mode, which takes the overseas market as the direction, the economic interests as the core, the resource development as the basis and farming and breeding as the pillar, has been formed. In addition, the mode is a kind of agricultural industrialization, which integrates the agriculture, industry and trade into a whole and provides specialized pro-

duction of production and marketing, as well as socialized services and enterprises-type of management[6].

2.4 Analysis on threat

2.4.1 The factor of thought pattern. In the Pearl River Delta, the secondary and tertiary industries develop relatively better, for example, in 2008, the output of the secondary industry and tertiary industry has achieved 1 496.46 billion yuan and 1 406.952 billion yuan respectively, but the primary industry only has 71.145 billion yuan. With the increase of job opportunities, the varied way of getting income and the increasing costs of labor forces, the idea of despising agriculture and abandoning agriculture is prevalent. In economics, opportunity cost refers to the benefits and profits of doing the other things but using the same resources, or the costs one should pay for choosing something or abandoning something. The rural labor forces have many choices for using land. Comparing with the secondary and tertiary industry, the opportunity costs of undertaking agricultural production for rural labors are relatively higher, so many farmers choose to abandon agricultural production.

2.4.2 The income gap between urban and rural residents. The further development of urbanization in the Pearl River Delta area causes many problems. For one thing, the development space of agriculture is reduced; for another thing, rural labors, materials and capitals flow to cities, which lead to the further widening of income gap. It can be from Table 3 that though the income of urban and rural residents keeps stable from 2006 to 2008, the income gap has been enlarged gradually.

3 Countermeasures and suggestions for developing urban agriculture in the Pearl River Delta

3.1 Making use of the market direction to urban agriculture The market can guide the restructuring of agricultural structure and the production of agricultural products with high quality, so it can be the platform for the trade of agricultural production in the international market, and then promote the healthy development of urban agriculture. Therefore, the construction of the market for agricultural products should be given priority to, and the market-oriented direction for the development of rural agriculture will be stimulated by it.

3.2 Increasing investment in the agricultural infrastructure construction Although the Pearl River Delta is economically advanced area, its power in investing urban agriculture is limited, hence, the favorable policies issued by the government for constructing new village should be well made use of. The investment from Guangdong Province and the central government should be positively striven for, so as to perfect the agricultural infrastructure construction and improve the agricultural development level.

3.3 Realizing high-tech industrialization of urban agriculture Urban agriculture is high-tech agriculture, so it should cooperate with colleges and universities and scientific research institutions in the Pearl River Delta area and mutually develop the resources of urban agriculture. The personnel involved in urban agriculture should research and introduce the new species, equipments and technologies about urban agriculture to promote the transference, exemplification and promotion of the technological results, so as to elevate the high-tech industrialization of urban agriculture.

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