An Analysis of Current Situation of Industrial Land Use in Chizhou Economic and Technological Development Zone

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Abstract This paper analyzes the current situation of industrial land supply, use and structure and industry pattern in Chizhou Economic and Technological Development Zone, and selects 83 typical enterprises which can reflect the comprehensive industrial land utilization within this zone and the problems in economical and intensive utilization, to carry out the evaluation of economical and intensive utilization of industrial land. Based on the evaluation results, we find the problems in industrial land use and set forth corresponding recommendations in order to provide a reference for the future sustained land use in the development zone.

Key words Chizhou City, Development zone, Industrial land, Current situation

1 An overview of Chizhou Economic and Technological Development Zone

Chizhou Economic and Technological Development Zone, located in the southwest of Wanjiang City Belt, is bordered by Yangtze River Delta to the east and Central China Economic Coordination Zone, with a planning area of 11500 ha. In accordance with the development ideas of "developing the line along the river, protecting the hinterland", the development zone is divided into two parts (eastern park and western expansion area). The eastern park has a planned control area of 4000 ha and planned construction area of 3000 ha, with complete infrastructure in the park. It has 20 km of shoreline along the Yangtze River, and builds a national first-class open port-Chizhou new port, with annual handling capacity of 3000 kt. The western expansion area is located on both sides of Jinan-Qimen Highway, with a total construction land area of about 7500 ha. There is 1500 ha of land in the starting area[1].

2 Current situation of industrial land use in the development zone

2.1 Current situation of land supply The controlled area of the development zone is 11500 ha. As of 2012, 866.67 ha of land was approved for the development zone, and during 2001 - 2012, the land supply area was about 770.47 ha. During 2001 - 2005, the land supply area was small in the development zone, totaling 159.57 ha; the land supply gradually increased from 2006; during 2008 - 2012, the land supply was relatively stable, and the land supply area was large in 2008 and 2010, more than 113.33 ha.

2.2 Current situation of land use As of 2012, the total area of built-up area in the development zone was 586.12 ha. The area of land for infrastructure and public facilities was 114.69 ha, accounting for 19.57% of the total area; the area of land for apartment was 467.94 ha, accounting for 79.84% of the total area; the area of land for commerce was 3.49 ha, accounting for 0.59% of the total area; the area of land for construction was 99.19 ha, accounting for 14.4% of the total area; the area of land for industry accounted for 79.8%.

2.3 Land use structure and industry pattern

2.3.1 Land use structure. 172.73 ha of land is approved for equipment manufacturing, and total construction area is 171.06 ha. 10.62 ha of land is for administrative office and living facilities, accounting for 6.14% of the land approved, with volume fraction of 0.99. 78.35 ha of land is approved for raw materials industry, and the total construction area is 76.77 ha. 5.25 ha of land is for administrative office and living facilities, accounting for 6.70% of the land approved, with the volume fraction of 0.98. 53.02 ha of land is approved for textile industry, and the total construction area is 52.39 ha. 3.52 ha of land is for administrative office and living facilities, accounting for 6.64% of the land approved, with the volume fraction of 0.99. 22.19 ha of land is approved for high-tech industry, and the total construction area is 21.59 ha. 1.57 ha of land is for administrative office and living facilities, accounting for 7.08% of the land approved, with the volume fraction of 0.97. 50.81 ha of land is approved for modern services, and the total construction area is 60.18 ha. 3.25 ha of land is for administrative office and living facilities, accounting for 6.40% of the land approved, with the volume fraction of 1.18.

2.3.2 Industry pattern. Since 2011, the industrial structure of the development zone in Chizhou City has been constantly optimized, the industrial chain has been gradually extended, and the industrial agglomeration benefits have been increasingly clear. It becomes an important part of industrial distribution and market cycle in Wanjiang City Belt. Currently, the development zone in Chizhou City forms the industry pattern led by equipment manufac-

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turing and raw material industry, coupled with high-tech industries and services.

3 Problems in industrial land use

3.1.1 Extensive use of industrial land. In the early period of construction, the supply of land was sufficient, but the public facility was not perfect, so the introduction of the enterprise in the development zone is the primary task. However, it ignored the setting of enterprise entering threshold, resulting in idle industrial land and inefficient use of land in the development zone (a total of 25.82 ha of idle land and 43.85 ha of inefficiently used land). These enterprises which practice extensive land use mode are difficult to expel, because the original enterprises have complied with all the necessary formalities and invested in the construction, and they are unwilling to accept the compensation.

3.1.2 Generally low intensity of business investment. The development zone has stipulated the investment intensity by documents, but at the initial stage of founding of the development zone, the land price was not high, and the enterprises generally lacked the awareness of economical and intensive land use; labor-intensive enterprises were the major enterprises entering the development zone at the early stage, and the enterprises invested insufficient funds in land, resulting in generally low intensity of investment of enterprises in the development zone, and the intensity of investment for only 54.1% of enterprises was higher than 199900 yuan/ha.

3.1.3 Deflection of existing industrial structure from planning. The industrial development planning of the development zone in Chizhou City points out the direction of industrial development is to promote traditional industries, competitive industries and emerging industries, build a demonstration zone for strategic emerging industry in the province. However, the analysis of current industrial land use shows that the industrial structure in the development zone is still dominated by equipment manufacturing and raw material industry, and the existing industrial structure deflects from the planning.

3.1.4 Single industrial structure and low value-added. The development zone in Chizhou City is dominated by equipment manufacturing and raw material industries, characterized by low technological content, low profit and small scale, resulting in single industrial structure in the development zone and low value-added of industry. The industrial structure is not rational, the industry is still labor-intensive, and service industry lags behind.

4 Economical and intensive utilization of industrial land in the development zone

By selecting 83 typical enterprises in the development zone (33 equipment manufacturing enterprises, 18 raw material industry enterprises, 12 textile industry enterprises, 10 high-tech industry enterprises, and 10 modern service enterprises), we evaluate these typical enterprises' economical and intensive utilization of industrial land to reveal the current situation of industrial land use in the development zone.

4.1 Indicator system Evaluation indicator system consists of goal layer, sub-goal layer and indicator layer (Table 1).

Table 1 The evaluation indicator system for economical and intensive utilization of industrial land

Goal layer	Sub-goal layer	Indicator layer
Land use status	Land use structure	Office space ratio
		Green space ratio
		Productive land ratio
		Other land ratio
	Land use intensity	Fixed asset investment intensity per unit area of land
		Volume fraction
Land use level	Land use benefit	Output-input ratio
		Output intensity

4.2 Integrated score of intensity Using the evaluation model established by Wang Yuning and Yu Zhongxiang for economical and intensive land utilization[2], we calculate the integrated score of intensity of industrial land use in the development zone (Table 2).

Table 2 The integrated score of land use intensity of enterprises in Chizhou Economic and Technological Development Zone

Industry type	Plot number	Realization score	Intensity score	Industry type	Plot number	Realization score	Intensity score
Equipment manufacturing	2	75.63	48.09	Raw material industry	7	79.49	86.36
	3	78.13	95.38		11	78.70	87.32
	4	89.12	91.80		25	100.00	87.27
	16	76.19	79.62		30	100.00	93.06
	17	88.54	89.68		38	97.70	89.86
	18	80.83	92.34		42	100.00	90.98
	19	100.00	60.58		45	100.00	89.20
	20	89.51	82.53		52	84.44	88.40
	21	98.47	87.62		53	45.83	81.02
	24	99.10	81.63		56	73.41	75.59
	26	100.00	83.49		62	86.47	91.55
	28	89.82	93.48		63	85.62	78.78

(to be continued)

(continued)

Industry type	Plot number	Realization score	Intensity score	Industry type	Plot number	Realization score	Intensity score
	32	100.00	77.86		66	78.79	88.88
	33	85.00	84.42		69	83.33	92.84
	35	93.59	92.28		80	76.10	78.05
	39	90.00	72.18		83	94.91	90.09
	40	94.44	95.64		85	100.00	94.87
	41	84.52	86.97		91	84.77	80.25
	43	100.00	95.51	Textile industry	6	82.78	69.01
	44	91.67	91.85		8	71.21	83.48
	46	94.83	89.33		14	37.31	31.40
	48	89.82	66.75		29	100.00	90.05
	49	90.20	93.83		34	92.59	70.61
	50	65.32	87.55		47	80.83	88.12
	55	68.50	75.53		51	80.51	85.38
	57	100.00	75.03		60	72.57	85.88
	61	66.11	64.39		65	75.82	72.80
	67	84.70	59.40		68	90.74	81.87
	70	88.48	84.91		79	100.00	88.31
	72	80.36	90.88		84	75.56	79.52
	76	85.21	96.28	High-tech industry	10	100	49.30
	77	89.09	81.97		12	69.23	80.51
	78	86.72	93.56		23	100.00	95.75
Modern service industry	5	86.76	84.24		27	100.00	87.59
	9	100.00	62.62		36	100.00	91.12
	13	83.87	81.68		37	100.00	86.69
	15	73.33	79.35		54	71.27	87.85
	22	88.89	88.85		58	85.92	74.29
	31	100.00	82.44		59	72.22	78.89
	81	86.67	86.35		73	100.00	85.98
	88	100.00	84.03				
	90	86.36	85.11				
	92	89.29	82.06				

4.3 Potential calculation Based on the overall land use planning, urban planning, relevant land use standards and integrated score of land use intensity of the development zone in developed regions, we grade the economical and intensive utilization of industrial land for typical enterprises in the development zone (Table 3). (Evaluation criterion value of economical and intensive use of industrial land – Integrated score of intensity) × Total land area for enterprises = Potential value of economical and intensive use of industrial land for enterprises (Table 4).

Table 3 Evaluation criteria for typical enterprises´economical and intensive utilization of industrial land

Industry type	Highly intensive	Intensive	More extensive	Extensive
Equipment manufacturing	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
Raw material industry	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
Textile industry	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
High-tech industry	F > 95	95 ≥ F > 80	80 ≥ F > 60	F ≤ 60
Modern service industry	F > 95	95 ≥ F > 80	80 ≥ F > 60	F ≤ 60

4.4 Evaluation of economical and intensive utilization The land use of 1 high-tech enterprise is highly intensive, accounting for 10% of the total number of such enterprises; the land use of 14 equipment manufacturing enterprises is highly intensive, accounting for 42.42% of the total number of such enterprises; the land use of 7 raw material enterprises is highly intensive, accounting for 38.89% of the total number of such enterprises; the land use of 1 textile enterprise is highly intensive, accounting for 8.33% of the total number of such enterprises; there is no modern service enterprise with highly intensive land use. Obviously, the proportion of equipment manufacturing enterprises with highly intensive land use is highest, followed by raw material enterprises, high-tech enterprises, textile enterprises, and modern service enterprises (Table 5). From the analysis, it is found that low-level labor-intensive resource-consuming exogenous economy is the main development feature of Chizhou Economic and Technological Development

Zone. This development zone has entered into the later-stage of industrialization, and traditional economic growth pattern does not apply to the current development with resource and environmental constraints and deterioration in the external environment. The land, labor, raw material and energy advantages of the development zone are gradually missing.

Table 4 Calculation of industrial land potential in Chizhou Economic and Technological Development Zone Unit: ha

Industry type	Plot number	Land use potential	Area of land for enterprises	Industry type	Plot number	Land use potential	Area of land for enterprises
Equipment manufacturing	2	1.34	3.20	Raw material industry	7	0.61	1.36
	3	0.00	3.03		11	0.62	1.78
	4	0.00	4.04		25	1.22	3.32
	16	0.13	1.25		30	0.98	2.49
	17	0.01	2.69		38	0.89	2.35
	18	0.00	2.13		42	4.70	12.91
	19	0.79	2.67		45	0.62	1.45
	20	0.25	3.36		52	1.31	3.36
	21	0.07	3.05		53	0.46	1.20
	24	0.44	5.31		56	1.19	3.05
	26	0.22	3.33		62	2.39	6.16
	28	0.00	1.89		63	3.05	8.51
	32	0.53	4.34		66	0.43	1.09
	33	0.19	3.39		69	0.26	0.68
	35	0.00	1.44		80	1.44	3.94
	39	0.18	1.00		83	5.42	13.33
	40	0.00	1.33		85	1.15	3.34
	41	0.04	1.33		91	3.07	8.03
	43	0.00	1.37	Textile industry	6	2.90	6.45
	44	0.00	1.57		8	0.45	1.03
	46	0.01	1.09		14	1.45	3.33
	48	0.47	2.00		29	0.86	1.95
	49	0.00	2.00		34	0.88	2.00
	50	0.02	0.66		47	0.62	1.41
	55	0.18	1.25		51	0.59	1.33
	57	0.20	1.31		60	0.89	2.01
	61	0.30	1.18		65	2.85	6.50
	67	0.45	1.46		68	0.99	2.25
	70	0.19	3.82		79	9.52	21.64
	72	0.00	3.01		84	1.36	3.12
	76	0.00	4.59	Modern service industry	5	3.92	7.84
	77	2.73	34.00		9	1.66	3.33
	78	0.00	64.64		13	1.69	3.39
High-tech industry	10	0.96	2.00		15	0.65	1.31
	12	0.57	1.19		22	0.74	1.49
	23	1.20	2.50		31	0.72	1.44
	27	0.56	1.17		81	0.48	0.97
	36	3.21	6.71		88	3.32	6.66
	37	1.16	2.42		90	3.32	6.66
	54	0.72	1.50		92	3.99	8.01
	58	0.78	1.62	—			
	59	0.77	1.60				
	73	0.71	1.48				

5 Conclusions and recommendations

5.1 Conclusions This paper analyzes the current situation of industrial land supply, use and structure and industry pattern in Chizhou Economic and Technological Development Zone, and selects 83 typical enterprises which can reflect the comprehensive industrial land utilization within this zone and the problems in economical and intensive utilization, to carry out the evaluation of economical and intensive utilization of industrial land. Based on

the evaluation results, we find the problems in industrial land use and set forth the following recommendations in order to provide a reference for the future sustained land use in the development zone.

Table 5 Evaluation results of economical and intensive utilization of industrial land in Chizhou Economic and Technological Development Zone

Industry type	–	Class I	Class II	Class III	Class IV
Equipment manufacturing	Plot number	76, 40, 43, 3, 49, 78, 28, 18, 35, 44, 4, 72	17, 46, 21, 50, 41, 70, 33, 26, 20, 77, 24	16, 32, 55, 57, 39, 48, 61, 19	67, 2
	Value range	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
Raw material industry	Plot number	85, 30, 69, 62, 42, 83	38, 45, 66, 52, 11, 25, 7, 53, 91	63, 80, 56	–
	Value range	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
Textile industry	Plot number	29	79, 47, 60, 51, 8, 68	84, 65, 34, 6	14
	Value range	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
High-tech industry	Plot number	23	36, 54, 27, 37, 73, 12	59, 58	10
	Value range	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60
Modern service industry	Plot number	–	22, 81, 90, 5, 88, 31, 92, 13	15, 9	–
	Value range	F > 90	90 ≥ F > 80	80 ≥ F > 60	F ≤ 60

5.2 Recommendations

5.2.1 Establishing the economic restraint mechanism and using taxation and pricing mechanisms to regulate industrial land. It is necessary to establish the economic restraint mechanism for the economical and intensive land use in the development zone, use tax incentives to encourage companies to save land, optimize the policy environment for undertaking industrial transfer, and promote the contribution rate of industrial land. There is also a need to use price mechanism to regulate the industrial land to form two pricing policies[3], increase the occupation cost of industrial land, and guide the enterprises in the development zone to exploit the existing land resources and intensively use land.

5.2.2 Strictly implementing project access system and encouraging enterprises to increase investment intensity. It is necessary to set up project examination and verification leading group, establish the project reporting and access system, strictly control the establishment of project, and abolish those projects which does not comply with industrial policies from the source. After the land supply, the management committee of the development zone should organize various departments to jointly supervise the real-time project construction, regularly carry out verification to ensure the implementation of the project in accordance with the construction plan, and prevent inefficient land use[4]. Through preferential policies and volume fraction and building density planning restriction, it is necessary to encourage enterprises to develop high-rise buildings and underground space.

5.2.3 Strengthening the industrial guidance and promoting the industrial re-updating of the development zone. It is necessary to vigorously promote the cooperation and industrial clustering[5], actively introduce the leading high-tech industry and modern service industry, and encourage similar large-scale enterprises to cluster in the development zone, in order to promote industrial agglomeration and form scale effect. It is necessary to strengthen the high-tech project cooperation, further improve the level of land use, optimize the industrial structure, and vigorously promote re-updating of industrial structure of the development zone[6].

5.2.4 Establishing and improving the withdrawal mechanism for the inefficient industrial land in the development zone. It is necessary to regularly carry out evaluation on the economical and intensive land utilization, establish and improve the withdrawal mechanism for inefficient industrial land in the development zone, and rectify the enterprises inefficiently using land[7]. In addition, it is necessary to levy idle land fees on the enterprises which stop the use of construction land without approval in accordance with laws, and set a time limit for these enterprises to start construction. For the construction site without starting construction for 3 – 5 years, not caused by government, the development zone retakes the land without compensation.

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